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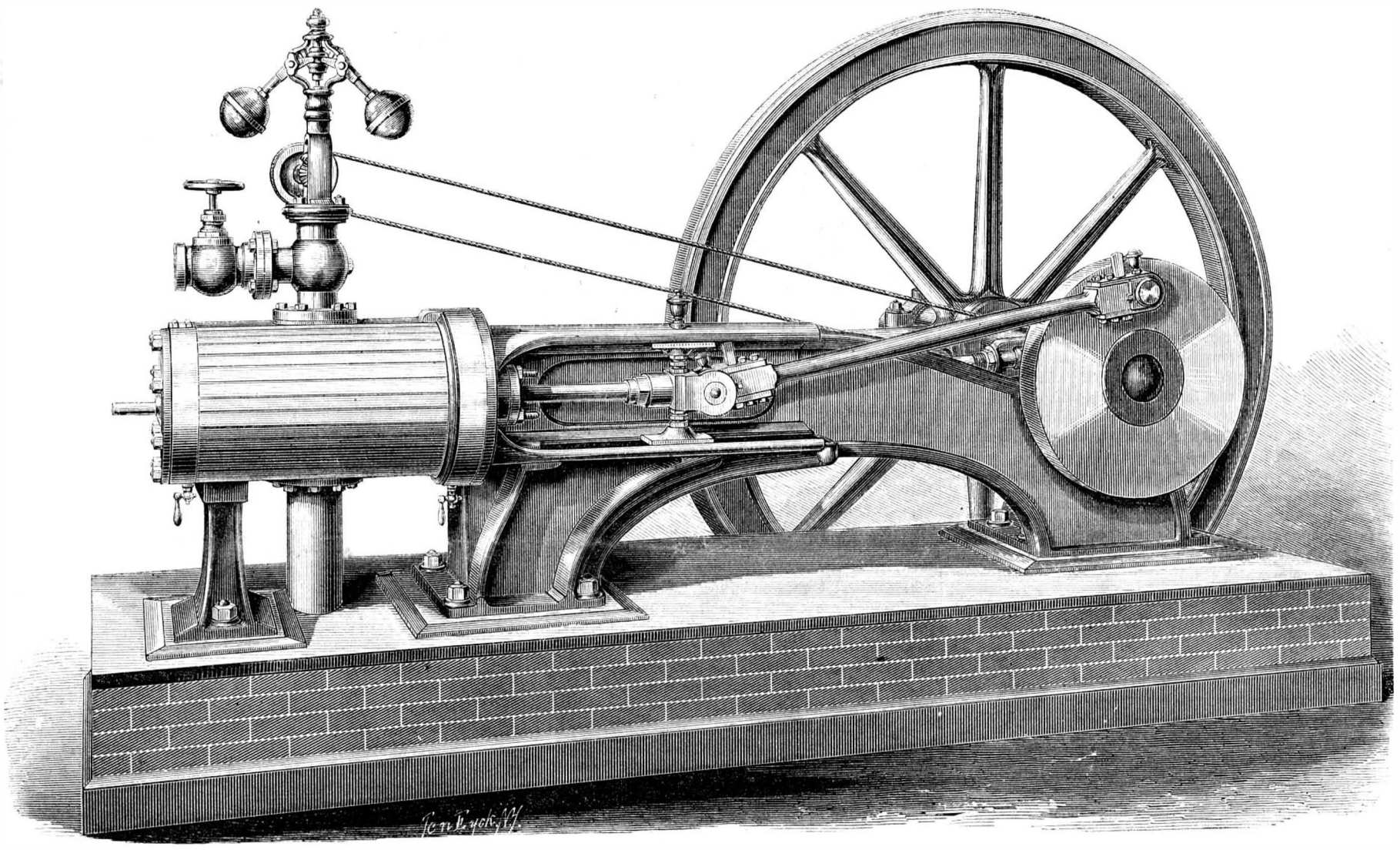
Improved Horizontal Steam Engine.

The design of the horizontal steam engine, illustrated in the accompanying engraving, shows that in engineering as well as in other matters, "Westward the star of empire takes its way." For a long time the principal cities in the Atlantic States have supplied the market with the best class of engines, and still the larger proportion of engines yearly turned out, are from Eastern manufactories. The design herewith presented will show, however, that the older shops in the East are no longer free from Western competition, and that they must now expect to yield at least a portion of the field to younger, though fully as enterprising, establishments.



COOPER & CO.'S STATIONARY STEAM ENGINE.

This engine is built from designs prepared by Mr. Isaac V. Holmes, who, for a number of years was superintendent of construction at the Novelty Iron Works, New York city.

In the planning of a steam engine, the great desideratum to be obtained is, the combination of simplicity of parts and proper distribution of material for strength, with such a correct proportion of the working mechanism as shall give the highest possible stability, durability, and economy in the use of steam. These points have been kept prominently in view in this engine.

The bedplate contains, in one casting, the shaft, pillow block, crosshead, slides, cylinder head, and stuffing boxes for piston rod and valve stems, thereby avoiding all trouble from bolts and joints failing or working loose. Its form and section are those of a girder, wherein the metal is so distributed as to give great firmness and stability.

The end of this bedplate containing the pillow block is formed with heavy flanges, extending out into a broad and strong base to rest upon the foundation; while the opposite end, forming the cylinder head and slides, is so disposed as to furnish an equally strong supporting base for the cylinder, the two being united by an elliptical arch, which resists all lateral motion caused by the angular thrust of the connecting rod.

To this head, provided with broad and heavy flanges, is bolted the cylinder and steam chest in one casting.

The chest, being placed at the side, gives ample width, to the structure, for stiffness, and also allows the cylinder posts to extend below the bottom line of the cylinder bore, to insure complete drainage through the exhaust passage.

The outer end of the cylinder is provided with a faced lug, resting upon, but not attached to, a pedestal firmly bolted to the foundation. This supports the weight of the cylinder, and, at the same time, allows perfect freedom for expansion caused by the heat of the steam; and, as the cylinder, steam chest, slide valve, and piston rod, lengthen in the same direction, the engine will have the same clearance and lead when at work as when cold.

In the manufacture of these engines they are divided into three classes; first, those with the single slide valve, cutting off by lap, at two thirds of stroke, and not adjustable, with a good reliable governor attached to steam chest; strong, plain, solid engines, adapted to saw mills and any kind of work where simplicity and durability are wanted, and where saving of fuel is not an object. The second class includes those with cut-off valves, arranged to close at any part of the stroke, and adjustable by a hand lever while the engine is in motion; the cut-off point being indexed, so that the engineer can see it, and the speed of the engine being regulated by a Judson governor. Engines of this class are suitable for driving grist mills and other machinery carrying a steady load, and only varied at stated times, when the point of cut-off can be readily adjusted to the load; and they are claimed to give, under such circumstances, a maximum result in the economical consumption of fuel, combined with a simplicity of valve gear that can be placed in the care of ordinary engineers.

The third class comprises those with steam-jacketed cylinders, fitted with the Babcock & Wilcox patent automatic cut-off, valve gear, and governor.

These engines are especially adapted to use in mills and manufactories where the power is variable; and it is claimed that they combine, in the highest degree, strength and durability, with perfect regularity of motion, and consumption of the least amount of fuel. We are informed that engines of this class having developed a horse power with 2 $\frac{7}{10}$ pounds coal.

In the designing of these engines, the flat slide valve, embodying the most favorable possible conditions for tightness after wear consequent upon long use, has been adopted; also, all the journals and bearings are fitted with self-feeding oil-cups. The piston rods, pins, rods, and connections are of polished steel.

The manufacturers of these stationary engines have also adopted the same principles of construction in their portable engines.

Parties wishing for further information and descriptive circulars, can address the manufacturers, John Cooper & Co. Mount Vernon, Ohio.

Potato Diggers.

Commissioner Capron, in his last report, says:

The number of patents granted, during the year, on potato diggers shows that the zeal of inventors with reference to these machines is unabated. It is questionable whether a really effective machine for digging potatoes has ever been brought before the public; that there have been very many which are utterly worthless, is certain. The large majority of these inventions are too cumbrous and complicated to be sufficient.

It will do well enough to multiply wheels and springs ratches and pawls, when these are to be employed in shops, and places where there will be no extraneous hinderance to the operation of the machinery; but when it comes to adorning with these appliances a potato digger which has to deal with the insidious soil, penetrating into every crack and crevice, the fewer of these devices, the better the result.

Many of the inventors of potato diggers have put their theoretical ideas into such shape that a person who wants to see the model of machine calculated to clear the vines, remove the earth, raise the potatoes, sift them clean, separate the large from the small, and deposit each sort into different baskets, can have his curiosity gratified by inspecting the cases of the United States Patent Office.

The potato diggers patented are generally a modification of a structure like the following: A rectangular frame mounted on two wheels and provided with a tongue, with a vertically adjustable scoop or shovel, affixed by suitable pendants or hangers, which has been designed to pass under the hill, carrying the earth and potatoes back to a shaker, where they are separated, the earth dropping, and the potatoes being carried to a screen, where they are more thoroughly cleaned. The shaker is often a revolving apron, but more frequently a series of bars or rods, which are occasionally jointed or hinged in such a way as to admit of a "jumping," or vibratory motion. Occasionally one or more revolving shafts is placed beneath the shaker, such shafts being provided with spurs or

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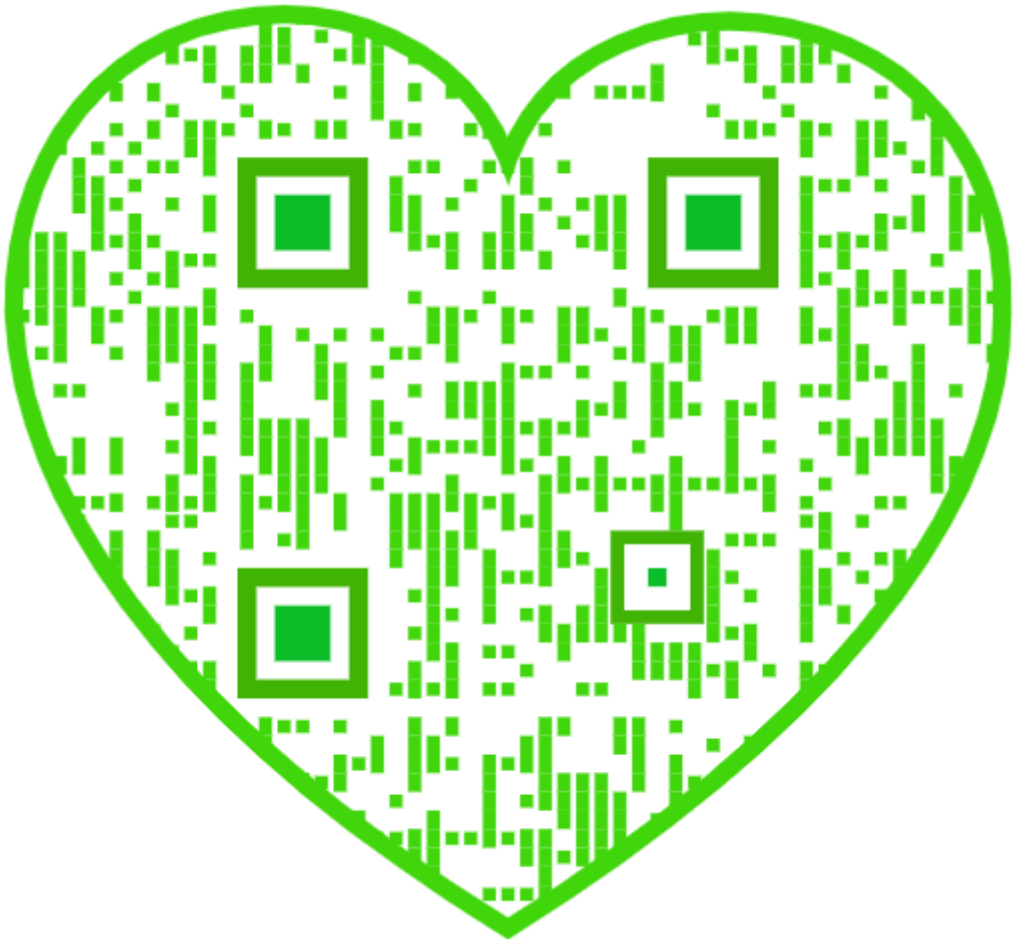

teeth passing up between the rods, the more effectually to disintegrate and remove the adhering soil.

During the year, there were two inventions in this line patented, which differ radically from those patented in any previous year, and which promise great effectiveness. The first is provided with wheels, tongue, and frame as above described. To the tongue, about at the juncture with the whiffletree, there is secured a shovel plow, which is intended to remove the soil from the top of the potatoes. Just in the rear of this plow, one on each side of the line of the tongue, are placed two rollers, whose longitudinal axes are parallel with the direction of the draught, and which consequently revolve transversely to the track of the machine. These rollers are revolved by suitable gearing from the traction wheels and are provided with curved teeth, spirally arranged, which enter the soil, raising and cleaning the potatoes. The other machine has, for the digging and cleaning parts, two concave disks arranged at an angle of about 45°, which are perforated or slotted to permit the passage of the earth, the potatoes being delivered in a single line at the rear of the machine and directly in the opened ridge.

HARVESTERS.

In the department of harvesters the inventions patented are directed exclusively to the improvement of standard machines. The beginning of the year found reaping and mowing machines with numerous defects, the chief of which were faulty gathering and delivering devices. Many of the machines belonging to this class require, besides the driver, a man or boy to rake up the cut grain in suitable bundles and discharge it from the platform. Much has been done toward dispensing with the attendant, and making the machine automatic. In performing the operation of gathering, the revolving rake is generally and successfully employed. The defect in the delivery arrangement is this: the grain has been discharged directly in the rear of the machine, or upon that portion of the ground occupied by the grain just cut, so that the horses in making their next circuit tramp upon it if it be not bound and removed. To obviate this a number of patents have been granted during the past year in which are employed automatic binders, designed to secure the cut grain in sheaves, which are deposited on the ground at a point out of the way of the horses.

The tendency of improvements in harvesting machines is to make them lighter and cheaper, the latter desideratum being often obtained at a sacrifice of substantiality in the structure. It is matter of remark how much power is employed in a harvesting machine to effect a small amount of work. It is obvious that to cut a swath of grain requires no greater strength than that in a man's arm, and yet to accomplish it, two to four horses are generally employed. This point has not been overlooked, and efforts have been made to mitigate the evil.

It is esteemed a desideratum to have one machine adaptable to the cutting of both grass and grain. To accomplish this result, efforts have been directed to producing a change of motion, as to cut grass a greater rapidity of the cutting instrument is required than in cutting grain. The common method is that in which a sliding pinion or spur wheel is employed, so that by a change from a large to a small gear, or *vice versâ*, the speed of the cutter may be increased or diminished.

Of the devices used directly to cut the grain, including the endless toothed belt, the rotary saw, and the reciprocating cutter-bar, the latter retains by far the larger number of admirers. Outside of the fact that inventors would naturally endeavor to evade the patent on this device, and to procure some other instrumentality that, without infringing it, would effect the same result, efforts have been made to avoid, by some means, the noise, shaking motion, and jar caused by the rapid working of these machines, as prejudicial to the nerves of the operators as to the durability of the implements. The other devices named, the belt and the rotary saw, are not so obnoxious to the charge, but they do not meet with the favor which is lavished on the reciprocating cutter-bar. To obviate this shaking, and noise, an inventor some years ago obtained a patent for a divided cutter-bar, but arranged the dead-centers of the cranks, to which the cutters are connected, at right angles to one another, thereby just doubling the evil. It is obvious, however, that this invention may be turned to advantage by arranging the dead-centers in a line, whereby the shock of one side will be met and counteracted by that of the other, and thus produce a smoothly running and almost noiseless machine for harvesting operations.

ARTIFICIAL JEWELRY.

Condensed from the English Mechanic.

This is a very extensive and important trade. It is of remarkable interest to a superior class of English artisans just now, because the factories, which used to furnish the promenades, the shops, and the pavilions of the Palais Royal, in Paris, are idle and silent for awhile, and the manufacture is coming over to England.

Your Parisian master is a critic of precious stones; he knows how to cut them, he then knows how to mount, and, immediately afterwards, how to imitate them; he is an artist in enamel, mosaic, and gilding; he can amalgamate gold with silver, producing every kind of splendid illusion. Now amongst the objects of human desire, vanity considered, may be reckoned jewels, true or false; they are prized for particular variations of weight, light, and color. There are worshippers of the diamond, and devotees of the opal; the ruby has its adorers, and the emerald its slaves. But we cannot all afford to wear these gems of the earth, with their far-darting rays and gleams of twinkling brilliance. A philosopher's stone, of some sort, must be found, which shall convert cheap substances into glories; and to begin with—what is the false French diamond, for which so enormous a desire has for years been exhibited at Paris, which was, until lately, the very center of this sparkling commerce? It is a bit of colorless paste, super-imposed upon another, with a darting central radiance; both perfectly white, except for the prismatic aurora incessant playing through them. But you may g ind, for this most fanciful among the fancies of mankind, an oriental sapphire, a topaz, an amethyst, or a crystal; and out of the gleaming powder shall arise a beautiful imposture, which none except a professional lapidary would pronounce to be other than a diamond. But the process is exceedingly delicate, excessively difficult. The cutting is a most singular art; the tools must be selected with not less scrupulousness than are medicines for delicate children.

And as for the ordinary materials! Fancy a Parisian mechanic, engaged upon these manipulations, employed to make a false diamond out of white sand; first washed with hydrochloric acid, and then with simple water, minium, calcined soda and borax, and oxide of arsenic! Here we have a combination entirely lucid; but when the Parisian artisans came to the sapphire—the second in their estimation, of all precious stones—they have to deal with its wonderful and varying colors as of those, especially, from Pegu and Cambay, from Ceylon and Bohemia. The obstacle lies in the production of that lovely dark light, burning in, and bursting from, its heart; for which the stone is famed, in all its hues—white, (the rarest), pale blue, ruby tinted, vermilion, milk colored, violet, and green. Well, go to the Jews of Amsterdam, and they will charge you a hundred guineas for a sapphire; but buy a little strass and oxide of cobalt, and you can make one for yourself. We lay no great stress on the Parisian fabrication of chrysoberyls, chrysopals, and "floating lights," which are really not jewels in the strict sense of the term. The last, known in the slang of the French market, as aquaphonanes, are of an asparagus green, rather shell-shaped, with two refractions, and pretty enough when flashing under a galaxy of chandeliers. But the French, and, in a still greater degree, the English mechanics, have encountered a far deeper embarassment in treating the ruby—always providing that mere red glass and the other pitiful ideas of toy arcades are out of the question. Properly speaking, there is only one ruby, (known to the lapidaries as the spinel), of a tender red; the Oriental, Barbary, and Brazilian are generally sapphires, amethysts, or topazes. The color of the true stone may best be described, perhaps, as a combination, exquisitely delicate, of rose and cherry; but some are wine-tinted, or of a violet hue, or tinged with yellow. It is astonishing how far a mixture of white lead and pulverized and calcined flints will go in competition with the jewel beds of India. So with emeralds: the same paste as is used for artificial diamonds, is blended with a precipitate of oxide of copper, and the green gem sparkles brilliantly. The garnet requires paste dyed with the "purple of Cassius;" it is, however, exceedingly difficult to imitate its starlike ray. Oxide of cobalt and the Cassian purple will produce a beautiful semblance of the amethyst, though a better is obtained by a mingling of white sand, treated with hydrochloric acid, red lead, calcined potash, calcined borax, and the purple. Thousands of these mock gems are annually sold, at considerable prices; and thousands of them are worn by those who would have the world believe in heirloom jewels.

Do you admire Mademoiselle's coral necklace? It is made of resin and painter's vermilion—about as much of the latter as dazzles on her cheek. Or her pearls? False pearls were absolutely invented in the capital of France—false in so many of its fashions. Thence the art spread throughout Italy. The manufacture is exceedingly curious. As its foundation are used the scales of the blay, a small flat fish, with a green back and a white belly, the latter being of a very silvery appearance, and easily detached. The scales are scraped into bowls of water continually changing, dried in a horse-hair sieve, melted, and converted into "essence of the East," to which is added a little gelatine, and this mixture is spread, with the utmost care, over delicate globes of glass. When cool, these are pierced and filled with white wax, to give them the necessary solidity and weight. Ocassionally, real opals, powdered, are used for the more costly kinds. The Turks carry on a great traffic in "pearls of roses," colored from rose leaves crushed in a mortar. The black, red, and blue varieties are mimicked with equal ease, and there is an affectation of adding to their charm by perfuming them during the process with attar and musk. Among the ingredients also employed may be mentioned Japanese cement and rice-paste. The modern romans have a simpler method. They use little alabaster marbles, and the scales from oyster and other shells triturated in spirits of wine, coated with white wax, heated to a high degree. The trinkets imported as "Venetian Pearls" are glass, and their production presents no difficulty.

Now, as to the mounting. Infinite care is bestowed upon this by your French artificer. He has to consider how his sham settings—they must be sham since he must sell them cheap—are likely to suffer from the action of heat, of electricity in the atmosphere, of oxygen, of air and water, and of acids; and he resorts to copper, lead, platinum, iron, steel, gold, silver, and their amalgams accordingly. The history of their manipulation by his or several sets of hands, is worth noting: the softening, the purification, the moulding the washing, the hammering, the melting, the coloring or bleaching, the chiselling, and so forth, through an entire, technical dictionary. There are instruments for stamping instruments for welding, instruments for soldering. One workman chamfers; another flutes; another stands at the laminating machine; the fourth bends over the delicate enameller's knife, sharp as a diamond's edge, and nearly as hard; a fifth subjects the completed work to a microscopical examination. Not fewer than ten differently-shaped hammers are used. This industrial economy is peculiarly interesting. The diversity of aptitude, of course, encourages the division of labor, as will presently be seen more minutely.

For the moment, let us revert to the French meretricious jeweller's other arts—those of coating common with precious materials, and enamelling. Few persons have any idea of the extent to which these tricks in manufacture are carried. The ingenious and cheap French enamel, white or colored, made up into rings, collarets, and bracelets, brings a great profit to the workmen, and is really attractive. But it requires time and study to obtain a mastery over this art. There is the fixing of the translucent glass upon the metallic surface, the painting of the vitreous plane, the choice of tints, the subtle application of heat, the consideration of chemical action exercised by one oxide upon another, and the due admixture of materials. Then, the engraving of enamels is a task requiring all possible exactness and tenderness of touch. We hardly reckon among these gaieties—so to call them—of picturesque industry, mock mosaics, damascening, or gilding, although the last is a very important affair in the light of France, which pretends to be the great gilder of the world—gilding even its young men, as Juvenal dares to assert the Romans gilded their goddesses—of flesh and blood. The Parisians style this "gold" coloring—and their methods are extremely various—the oil, the hot, the cold, the bronze, the copper, the steel, and the ether; but the magic of silvering is scarcely less intricate, especially when the surfacing is to be totally false, or what is termed "argenterie des charlatans." As for coating copper with gold, which is quite different from gilding, this belongs altogether to a higher artisanship, applicable also to lead, and even to iron. Next in order are the much esteemed steel trinkets manufactured by the French. The invention is of old date, and the finish and polish of the fancies produced for the Palais Royal by the artificers of the riotous Faubourg St. Antoine have never been excelled, even by the ambitious mechanics of Austria, who are Dutch in their perseverance, and Italian in their taste. But, after all, these artists aim mostly at the imitation of jewels or gold.

Shall we reveal another of their secrets after the manner of a cookery book? Take a little powdered sulphur, sprinkle it with boiling water, mix well; boil the concoction, strain through fine muslin; put the liquid into a vessel containing the substance with which you desire to play the Rosicrucian trick, resort to another boiling, and your Cornish tin is—*presto!*—Babylonian gold! A dash of spring aloe juice, of salt-peter or sulphate of zinc improves the imposture. How far this deceptive art has been carried may be judged from its catalogue of styles: The Lamb, the Arch, the Turkish, the Myrtle branch, the Maltese Cross, the Dead, the Star, the Lance-iron, the Violin, the Hatchet, the Rose, and the Turtle. Into a similar category come agraffes, opera glasses, decorative shoe buckles, ornamental buttons, fancy watch keys, cream spoons, writing pencils, punch ladles, jewel caskets, scissors, pipes, egg cups, and tobacco boxes—all imitations, my friends, all gew-gaw, and yet not a little pretty.

But in no branch is this fraud—for it is a fraud when the prices charged are those due for genuine materials—pushed farther than in that of honorary decorations, without one of which no Frenchman appears able to live. There is the Order of St. Ampoule, or the oil which was brought from heaven by a dove. It is a bit of gilt copper with an attachment of black ribbon. The Palais Royal charges you fifty shillings for it. So with the order of the Weasel, of the Star, of St. Louis, of Mount Carmel, and St. Lazare, of the Dog and Cock of St. Michael and the Holy Spirit, and even of the Legion of Honor. They were all prostituted to the purposes of a jeweller's profit. Nor is it generally known what a manufacture of foreign decorations was, until lately, carried on at Paris. The English Order of the Garter itself has been forged in the French capital, and worn at continental courts. That of the Golden Fleece, the pride of Imperial Austria, has been successfully imitated, though its collar is at once exceedingly rich and of exceedingly delicate workmanship. We have seen Napoleon's Iron Crown—not to be compared with the old and proud *signum* of Lombardy—so perfectly counterfeited as to escape detection more easily than a mock Waterloo bullet. The Danish Government is so jealous of anybody assuming the blue ribbon of the Danish Elephant, that it ordains a perpetual exclusion from court of all individuals buying these spurious sparkles.

Now, not to prolong a series of examples already sufficient, we may again remark that a number of workmen in Paris have, for many years, been dependent upon this industry, and thrived by it. It is not by any means a degrading business. The deception is, in fact, no deception. It is avowed in the market-place; the objects are sold as shams; no one of common sense or knowledge could take them to be anything else; but they bring, or have usually brought, to the artisans of Paris, an enormous annual income.

IN our issue of February 18th, we published a short paragraph, stating that no successful advertising agency had been established south of Baltimore. We are in receipt of a letter from Walker, Evans & Cogswell, of Charleston, S. C., who inform us that they have conducted such an agency for many years, with entire success.

SILK CULTURE.—ERRATA.—In the article on "Silk Culture, published in our issue of March 18th, in column 2, paragraph 7, lines 2 and 4, for "*month*" read "*moult.*" In column 3, line 9, read "*hatching out*" for "*hatching only.*" In line 47, same column, for "*less importance*" read "*no less importance.*"

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ANNUAL ASSAY OF THE COINAGE.

BY F. A. P. BARNARD, LL.D.

It is provided, by the acts of Congress establishing and regulating the United States mint and its branches, that there shall be an annual scrutiny of the results of the operations of each year, in order to verify the fidelity with which the coinage is kept up to the legal standard, both as to weight and as to the degree of fineness of metal. This scrutiny is conducted by a commission, consisting of three members acting *ex officio*, and ten or twelve others appointed by the President of the United States. The annual assay of the coinage of 1870 was conducted at the mint in Philadelphia, on the 13th, 14th, and 15th days of February, 1871, by a commission composed as follows:

Ex-officio.—Hon. John Cadwalader, Judge of the United States District Court for the Eastern District of Pennsylvania; H. D. Moore, Collector of the Port of Philadelphia; and United States District Attorney, A. H. Smith.

Appointed by the President.—Prof. Joseph Henry, Smithsonian Institution; Prof. John Torrey, United States Assay Office, New York; F. A. P. Barnard, President of Columbia College; J. E. Hilgard, Assistant Superintendent of Weights and Measures; Hon. H. R. Linderman, Philadelphia; Prof. Fairman Rogers, Philadelphia; John J. Knox, Deputy Comptroller of the Currency; Hon. John P. Putnam, Boston, Mass.; E. B. Elliott, Esq., Washington, D. C.; Robert J. Stevens, Esq., San Francisco, Cal.; M. C. Read, Esq., Hudson, Ohio.

In order that the test may extend to every coinage of the year, the law requires that, at each delivery of coins made by the chief coiner to the treasurer, a certain number of pieces of each denomination shall be taken by the treasurer, in presence of the assayer, indiscriminately from the mass, carefully labelled, and placed in a chest having two independent locks, the keys of which are kept, one by the treasurer and one by the assayer. The branch mints being under the direction of the director of the principal mint, the coins reserved, as above described, at those establishments, are transmitted for examination to Philadelphia.

On the meeting of the commission, which takes place annually on the second Monday in February, all the packages of reserved coins are placed before the commissioners, and opened by them in presence of the director of the mint. The coinages of the several mints are kept separa e from each other, and the gold coins are kept separate from the silver. The commission is then arranged by the chairman into two committees, one for the trial of the weights, and the other for assaying the fineness.

The weighing committee thereupon takes, from the gold coins and also from the silver coins, of each mint, a certain number, not less than ten, embracing also more than one denomination, if there are varieties; and these are weighed in bulk. They also take any number of pieces, not less than five, and of differing denominations, if there be such present, to be weighed singly. All these are placed with the mint marks downward, and the weighing is conducted by the committee themselves, or by experts under their scrutiny. It is usual, finally, to weigh the whole mass of the gold coin, and also the whole mass of the silver coin, from each mint, which remains in the hands of the committee after the selection of pieces for assay.

The committee finally examines the weights ordinarily employed in the mint, and tests their accordance with the standards prescribed by law.

The committee on assaying takes, from the coins left by the other committee, a sufficient number for its purposes, and causes a portion of each parcel to be melted into an ingot. From each of these ingots a sample is then taken for assay. A convenient number of single coins, of different denominations, is also selected from each parcel, from which samples are taken in like manner. In the case of silver, the sample for the assay of mass is not cut from the ingot, but taken by granulation in water, previously to pouring the liquid metal nto the mold.

The gold is assayed by cupellation and quartation; the silver, by precipitation. The weight of the metal, to be tested, employed in each assay for gold, is one half a gramme. This is weighed out upon a balance sensitive to the twenty-thousandth of a gramme (the ten-thousandth of the weight employed). All the lesser weights are decimal subdivisions of this half gramme. The weights used in this process are kept in a box, with two independent locks, the key of one of which is in possession of the director of the mint, and that of the other in that of the Judge of the United States District Court for the Eastern District of Pennsylvania, who is *ex officio* chairman of the commission.

The samples, from which the metal for assay is taken, are hammered, and subsequently laminated between rollers, to facilitate the adjustment of the weight by cutting off minute portions. Each lamina is stamped with a distinctive number. Side by side with the coin assays, a test assay is conducted, in which the metal used is pure gold, cut from a roll kept for the purpose in the box containing the weights. As the standard fineness of the coin of the United States is 900 parts by weights of pure gold to 100 of alloy, the test assay is made upon $\frac{900}{1000}$ of a half gramme.

Silver is then weighed out for the quartation, from a roll of the pure metal, kept also in the box with the weights; and the several samples, properly enveloped in sheet lead, are placed in order, according to their numbers, and transferred in like order to the cupels. After being withdrawn from the muffle, the buttons are hammered, annealed, and laminated between rollers, each lamina being finally stamped on one end with its number. The specimens are then rolled into cornets, with the numbers visible on the external end, and are then deposited in the separate cells of a little platinum basket-like apparatus, which suffices to hold, in very small compass, sixteen or twenty specimens, to be treated all at once. This is immersed in a matrass or alembic of platinum, where the specimens are first boiled for ten minutes in nitric acid of 22° Baumé, and then twice successively, for the same length of time, in acid of 32° Baumé.

The specimens are then taken out, washed in distilled water, heated to redness, and finally weighed again.

Out of 8 separate assays of gold made by the commission for the present year, 3 gave exactly 900 parts to the 1,000, 1 deviated $\frac{1}{10}$ of a part, and 4 deviated $\frac{2}{10}$ of a part in 1,000. The law allows a deviation, technically called the "tolerance," of the two whole parts in 1,000, either above or below the legal standard; but the mint officers work, of course, as closely to standard as possible, without regard to tolerance. The results of the mint assays for many years show that the tolerance is unnecessarily large; and in the new bill for the regulation of the mint business, recently proposed by the Treasury Department, the tolerance is reduced to 1 part in 1,000.

The silver assays are made by weighing out 1,115 parts of the metal under trial, these parts being milligrammes. This weight is taken because, at the lowest limit of deviation from standard allowed by law (which, for silver, is 3 parts in 1,000, the standard fineness being, as before, 900 in 1,000), there will be just 1,000 parts of pure silver in the specimen. A test assay is also made by weighing out 1,005 parts of silver absolutely pure, which is subjected to the same processes as the specimens under scrutiny. All the specimens and the proof metal are introduced into numbered bottles, nitric acid is added, and a gentle heat is applied. The solution being complete, precipitation is effected by introducing, from a pipette, into each bottle, 1 decilitre of a standard solution of sodium chloride, so prepared as to contain, in this measure, 542·74 milligrammes of the salt—the quantity necessary to precipitate 1,000 milligrammes, or 1 gramme of silver. As the case never, or at least very rarely, occurs, in which the specimen is at the lower limit of tolerance, this dose of salt leaves some small amount of silver unprecipitated. The precipitate is therefore made to subside by agitation; and for this purpose a mechanical agitator is employed, put in motion by power derived from the shafting in the coining department, which expedient contributes greatly to economy of time.

When the liquid is clear, a small pipette is used, graduated so that each division indicates a quantity of the re-agent sufficient to throw down 1 milligramme of silver; and the number of these parts which are required to complete the precipitation fully, corrected by the indications of the proof assay, exhibits, when added to 897, the proportion of pure silver in 1,000 parts of the metal under trial.

In the recent assay of the silver coinage, out of 7 specimens, 2 were found to be in exact accordance with the standard; 1 was found to be $\frac{4}{10}$ of $\frac{1}{1000}$ above: 2 others were $\frac{8}{10}$ of $\frac{1}{1000}$ above; another, $\frac{1}{1000}$ below; and another, $\frac{1}{1000}$ above. As the tendency of silver alloys is to irregularity of distribution, in a greater degree than is true of those of gold, it is reasonable that the limits of "tolerance" for this metal should be greater; but these assays show that the amount of deviation, from the standard, allowed by law is considerably too great. The new mint bill proposes to reduce it from $\frac{3}{1000}$ to two and a half $\frac{1}{1000}$; but this reduction is by no means sufficient. There is no need that it should exceed $\frac{2}{1000}$.

HOW DO YOU PROVE YOUR PLUMB RULE?

A TECHNICAL LESSON.

The following particulars are authentic, and I remember all the parties. I shall condense from memory. The matter in dispute was a brick wall which fell shortly after its erection, the downfall of which, I believe, was accelerated by a downpour of rain. When the builder put in his bill for payment, his client refused to acknowledge any claim. The wall was certainly built, and the wall was certainly dowr. The client contended that it was badly constructed, and that it was put up in an unworkmanly manner; the builder, on the other side, was ready to swear and prove that it was erected by competent workmen, and that it was executed in a creditable and workmanlike manner.

The case had to be settled in the law courts, the builder being the plaintiff. The defendant secured the services of a clever, well known counsel, who was known to have a knowledge of architecture. When the builder was giving his evidence, he was submitted to a severe cross examination, in which his practical knowledge cut a very sorry figure. The particular point of the question turned upon the plumbing of the wall, whether it was truly perpendicular, and whether the plumb rule was correct. The builder said he was ready to take his oath that the wall was plumb, and that the plumb rule was quite correct.

"Listen for a moment, gentlemen of the jury," cried the defendant's counsel, "while I put this master-builder to the test. You will be able to judge of his practical acquaintance with his profession from the answer he gives. Well, Mr. Builder, you are ready to swear upon your oath that the wall was plumb?" "Yes." "You are?" "Yes."

"Will you be so good, Mr. Builder, as to turn round and tell those twelve intelligent jurymen in the box, how you know that your plumb rule was correct?"

The builder hesitated for a moment, and then replied: "I know it was correct, for my workmen are always careful and particular with their work."

"I am not disputing the character you give your workmen," replied the counsel; "I merely ask you to tell the jury how you know that the plumb rule worked with was correct?"

"I know it was correct," repeated the builder, "because it was made the same as all plumb rules are made, and used by men in the habit of using them."

"I must ask you again, Mr. Builder, to be so kind as to tell the jury and me how you are certain that the plumb rule was true? or, in other words, let us know how you prove your plumb rule?"

This was a poser.

"Now, Mr. Builder," continued the defendant's counsel, "you have come into court to make a claim against my client; you swear that the wall was built properly plumb, and that it did not tumble down from bad workmanship. I now ask you, as a respectable builder, to just explain to the jury the method of practically constructing and proving a plumb rule. You are no doubt aware that if a plumb rule be not correct, the work that it is applied to will not be correct. I am ready to prove that it was not correct, that the wall overhung. Geometrically speaking, it was out of perpendicular; consequently, the work was badly executed, and I deny that you have any claim for payment."

A silence for some minutes reigned, and then the plaintiff made one or two ineffectual attempts at explanation, but got so confused that he completely broke down.

"It is needless, you see, your lordship, and gentlemen of the jury, for me to carry this case much further. I will simply conclude by saying, here is an instance of the deplorable consequences attending rash assertions and wrongful claims. Men are found to come forward to make a claim for what they have no right to, or have forfeited, and are ready to fortify their unfair demands by swearing that they know practically what they do not know. Well, gentlemen of the jury, as the master-builder, when in the box, was unable to prove his plumb rule, perhaps he will not take it amiss for a lawyer to tell him how to practically construct and at the same time prove a plumb rule, which may be depended upon, for plumbing a straight wall, or any other description of perpendicular work. Take a piece of board a little more than the proper length, breadth, and thickness which you require. With a pair of compasses strike a circle on its face, within a few inches of each end. Plane straight on the edge until the sides of the circles are touched; repeat on opposite edge. When this is done, your piece of board will be of a parallel breadth. Then a line drawn through the center, with a slit for the cord, and an opening for the play of the "bob," will complete your plump rule. I am not an architect, gentlemen of the jury, but I believe no architect, builder, or workman, will say I have not given a practical method for proving a plumb rule. One word more, gentlemen: I think when a master-builder comes into court, and takes it upon himself to swear that his work was properly executed, he ought to be able to give us proof, when asked, of the workmanlike manner of its accomplishment. I now ask a verdict for my client."

The jury unanimously declared in favor of the defendant, the foreman saying that he himself, and his fellow jurors, were of opinion that the wall was badly constructed, and out of plumb, and that that was the reason of its fall.

It may be asked here, was the counsel for the defendant technically correct in his method of proving a plumb rule of any length? And it may be further asked, how many master-builders, and workmen, too, are there at the present hour, who, if called upon suddenly, could practically demonstrate, in proper language, the geometrical construction of a simple plumb rule, or straight edge? However astounding it may seem, I have come across many workmen who could not, without some thinking and groping, properly set out the egg oval opening, or "bob" hole, in their plumb rule. Archimedes is reported to have said, that if a prop, or position, and a lever, were given to him, he would move the world. Technical knowledge is the prop, the position, and the lever; and, without the ambition of the great Greek mathematician, it will enable a man, at some time or other, to lift himself in the world, and, morally and socially speaking, lift up the world at the same time.—*Builder*.

A Subterranean Pond---Eyeless Fish.

It is well known that great trouble and expence have been caused by the sinking of a portion of the track of the new Jefferson Railroad, where it crosses a swamp in Ararat township, Pa. It has been found, says the *Montrose Republican*, that under the swamp is a subterranean pond, of several acres in extent and of considerable depth. This pond is covered by about six feet in depth of black earth, which supports a heavy growth of woods. The trees are mostly soft maple, pine, hemlock and birch, many of them ranging from six inches to three feet in diameter. Last fall it was discovered that the subterranean pond contains many fish, of the kind usually found in ponds in this part of the country—pickerel and "shiners" among others—but all without eyes! In the darkness of their subterranean abode, they have no use for the organ of vision. The Ball Pond, about a mile and a half distant, is now "growing over." A considerable part of it has become subterranean within the last twenty years, and, probably, before many years it will be entirely covered like the other. This pond is about twenty acres in extent. For some distance from the shore, it is filled with a dense growth of water-lilies, and these no doubt, furnish the foundation on which the superstructure of earth is commenced.

LUNAR RAINBOWS are not so uncommon after all. We never saw such a sight ourselves, but many of our readers have if we may judge from the testimony now coming in. We cannot however, find room for the letters already received on the subject, and can only express the hope that our numerous correspondents may live to see other equally glorious celestial sights.

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THE "LUNA" MOTH.

BY PROFESSOR E. C. H. DAY.

Fairies, those unseen loves of our early, happy, unreasoning childhood, disappear, as years advance, into the category of mythical impossibilities; and, in truth, even with children, they are rapidly becoming an extinct race, exterminated by the hard facts of science; but who that has known them in his fancies, does not feel a pang of regret, when he finds that they may not pass into the realms of reality? Certainly such sprites must have been a great source of contentment to those ever-childish elders of past ages, who unwaveringly believed, all their lives, in fairies and goblins; such convenient agents as they were, to whom to attribute all manner of phenomena that could not otherwise be explained! It was so easy, and, at the same time, savored so delightfully of the marvelous to be able to say "'the good people' have been here this night, and have brought this," or tremblingly to recognize in mischief the hand of some elfin Robin Goodfellow. It was so much easier, we repeat, than to discover by close observation, careful experiment, and strict unimaginative induction, that good things are not fairy gifts special to ourselves, and to learn, worse still, how bad things are but too frequently the certain results of our own stupidity, folly, and viciousness—the most vengeful and inexorable of goblins. And it is to this, good reader, that science brings us. Oh, that we could sometimes believe in imps and fays!

Now, we do not know whether the inhabitants of America were ever blessed with elfin agencies; Indians would hardly have appreciated beings who could

> "Creep into acorn-cups, and hide them there;"

and roystering Dutchmen in their (not acorn) cups amid the lone valleys of the Catskills, would have been all too coarse associates for the monarch to whom

> "The elves present, to quench his thirst,
> A pure seed-pearl of infant dew,
> Brought and be-sweetened in a blue
> And pregnant violet."

As for genuine Yankee fairies and mermaids, never, except in Barnum's! And yet we almost wish that we could certify to the actual existence in America of a fairy queen, who, in a momentary whim, had decked the Luna moth in its beautiful garb; say, that it might attend her majesty's moonlight revels, fittingly adorned. Could we only have brought ourselves to have given to the reader as true such a pleasing myth, it would have saved us the trouble of a vast deal of, what he even now may deem useless, speculation. But first let us quote, from Harris, his admirable picture of this beautiful insect.

"Pre-eminent above all our moths in queenly beauty is the *Attacus* (now *Actias*) *Luna*, or Luna moth, its specific name being the same as that given by the Romans to the moon, poetically styled 'fair empress of the night.' The wings of this fine insect are of a delicate light-green color, and the hinder angles of the posterior wings are prolonged, so as to form a tail to each, of an inch and a half or more in length; there is a broad purple-brown stripe along the front edge of the fore wings, extending also across the thorax, and sending backwards a little branch to an eye-like spot near the middle of the wing; these eye-spots, of which there is one on each of the wings, are transparent in the center, and are encircled by rings of white, red, yellow, and black; the hinder borders of the wings are more or less edged or scalloped with purple brown; the body is covered with a white kind of wool; the antennæ are ocher-yellow; and the legs are purple-brown. The wings expand from four inches and three quarters to five inches and a half."

But to appreciate fully the beauty of the Luna, we should see the living insect, and as it flies by night; but few are fortunate enough to meet with it; and of those who do, there are many, even professing to be persons of taste, who would pass it by, as beneath their notice. Certainly, then, its beauty was not intended especially for the gratification of the eye of man. Some will say, that these colors were intended to gratify the Creator's idea of beauty; then what shall we say of all that is ugly, grotesque, and hideous in nature? And yet there must be some reason why this moth should be so beautiful; or else, we may better, after all, adopt the fairy theory, than any worse alternative. Is this endowment of such peculiar beauty of any value to the creature itself? It is not of a sexual character, for, as far as we know, the sexes are never very dissimilar.

Does its coloration, as is probably the case with some closely-allied, but differently colored, species, serve to protect it? On the contrary, the light color would probably render it more conspicuous to its enemies, so that the fairy gift would be an injury in disguise. The only escape from our difficulty appears to lie in remembering two facts, namely, that the perfect state represents but one phase of the insects whole life history; and, secondly, that all parts of an organism are wonderfully dependent upon, or correlated with, one another. As far as Nature's use of an insect is concerned, the larval is the really important stage of its existence; the reproductive stage, though essential, being only subordinate in purpose to the earlier one. Thus, as it is the caterpillars that do Nature's work in keeping down an excess of vegetation, it is they that have to be especially protected; and as long as a sufficient number of perfect insects are preserved to maintain the necessary supply of larvæ, the rest may perish. If not enough are being preserved, the perfect insects themselves will need protection; but, if too many survive, then the balance which Nature is striving to maintain, will be temporarily disturbed. What a delicate piece of machinery this vast system is!

METAMORPHOSES OF THE ATTACUS LUNA.

The peculiar tails at the hinder angles of the hind wings of the Luna moth fall into the same category as its coloration. As appendages to the insect, they have no purpose. There are butterflies, in which such tails, when the insect is at rest, represent the stem of the leaf imitated by the rest of the wings; but there are numerous species with tails, in which there is no attempt at any such imitation; and, in the case of our moth, any such imitative purpose is out of the question, because its wings do not close over the back in repose, so as to present the leaf-like form, even.

But though neither the color nor the form of the perfect insect appears in itself to have any definite purpose, yet they both must be intimately connected with the structure and conditions of life of the larva, and we may readily suppose them to be, one or both, dependent upon some very essential feature of its organization.

Perhaps—but our column is filled, and the dissatisfied reader asks, why we have wasted it upon such fruitless speculation? We have not, after all, explained why the Luna moth is so beautifully colored. We admit it; we have merely tried to indicate the direction in which such an explanation may be sought. We know that we all have a habit either of looking upon the beauties and wonders of Nature as utterly without meaning, or, at the best, of putting upon them a shallow interpretation, the first and easiest that chances to come to hand; and we have therefore thought it advisable to remind the reader again, that Nature is not an ill-arranged assortment of whims, and that it is quite time for us all to realize, that in Science at least, we must do without fairies.

Plastering.

In lathing for plasterwork, says the *Building News*, laths should break bond—an arrangement technically termed "snatching;" this gives a good hold to the joists, and makes a firm ceiling. Instead of the lathing being executed with rows of laths of equal lengths, joined by other rows of similar lengths, the bond should be broken by changing the length of the laths every five or six feet, and so causing one set to stretch across the joists to which the others have been fastened. This system takes more time than the ordinary system, and will not be adopted by men unless they are well looked after; it requires to be distinctly specified, on account of the extra labor. It is well to examine the cow hair provided for mortar before it is used; hair ought to be long and sound, but often it is brought to the building in bags, of short length and quite rotten, and no strength in it. This sort of hair makes the plaster far worse than it would be without any; the plaster should also be examined before being put upon the ceilings, by holding a little up with the spade; the quality can be detected by the hair hanging down. The finishing coat of plaster is sometimes set with hair in it; the plasterer picks out the white hair and beats it fine, then uses it with plaster of Paris. The last coat should be composed of about one third plaster to two thirds lime putty. The blotches or streaks sometimes seen in wall plastering are generally the result of bad work, though not so in all instances; a sooty or burnt brick in a wall, will sometimes cause an unsightly patch on the plaster; marks from this cause have been known to come, not only through the plaster, but through the papering also. New ceilings ought not to be whitened; whiting eats into the new work and injures it. Lime for mortar should be burnt but little; much burning destroys its nature; the phrase "lime to be well burnt," is apt to mislead. When sluiced, lime is much better than when slaked in the common way, by sluicing we mean letting it fall to pieces, instead of running it with water; it becomes much more durable for mortar, and especially for pebble-dashing in mortar. If, in mixing the lime for mortar or plaster, the least bit remains whole, though as small as a pin head, it will burst in time and throw the plaster off the wall. This explains the bursting occasionally seen on plastered walls. When the lime is run with water, this defect is not so frequent as when the lime is allowed to fall; the latter mode, however, makes a superior mortar, but the lime for this purpose is best prepared two or three months beforehand, which precaution prevents any portion of the lime remaining whole; it involves extra trouble in turning it over, which makes the mortar very expensive. I have known the following practice to be observed in making good mortar: The lime is spread on the ground and a little water thrown over it; the whole is then covered with sand and left for three or four days. The water slakes the lime into a powder; this is then mixed with the sand, and the whole passed through a sieve; it is then ready to mix with water, to form mortar or plaster.

The best way of forming plaster cornices is to run a muffled mold, muffled with plaster of Paris, upon a ground of hair mortar, and leaving about one third of an inch to be run afterwards with plaster of Paris and lime putty; this makes a much stronger cornice than is made by the present system which is only a result of a wish to expedite the work and make it cheap at the expense of quality of workmanship Plaster cornices often crack through there being common plaster mixed with the good; the common sets more quickly than the good, and the uneven setting produces cracks. It is a common practice to mix glue with plaster when there is doubt as to its quality; the glue causes the whole to take a longer time in setting.

MATERIAL FOR ICE HOUSES.—It is said that one of the best materials for ice houses is peat; but the genuine moss peat must be employed, and it ought to be cut in pieces fourteen inches long and five to six inches wide and thick. When it is thoroughly dried, it proves to be a poor conductor of heat; and when laid up around ice houses above the ground, is preferred by many persons to sawdust, tan bark, and the like. Peat has also been employed in Europe for building dams, and as protections to coffer dams, in laying subaqueous foundations.

REFINED oil, for fine mechanism, can be prepared by putting zinc and lead shavings, in equal parts, into good Florence olive oil, and placing it in a cool place till the oil becomes colorless.

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Improved Screw Wrench.

The object of this invention is to permit the quick adjustment of the movable jaws of screw wrenches where the relative position is changed to receive nuts of various sizes, and thus to save the time occupied in moving it the entire distance by the screw.

The engravings give an excellent representation of the wrench, showing the device in two positions; Fig. 1 showing the wrench adjusted for use, and Fig. 2 showing it in position to permit the rapid movement of the movable jaw to the place desired.

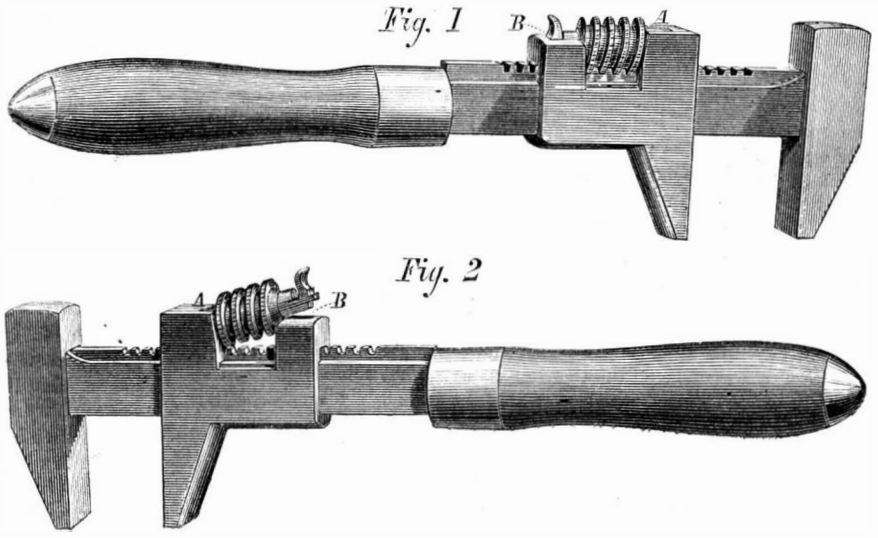
The shank of the wrench has a worm rack cut on the back as shown. The movable jaw has, at the back, two projections, which carry the worm and its pivot. The pivot of the worm is itself pivoted at A, and its free end shuts into a recess formed in the projection at B. When thus shut into the recess, the worm engages with the rack, and by turning it slightly the requisite nicety of adjustment is secured. The edges of the worm are milled so as to afford a good hold for the fingers. When the worm is thrown out of its engagement with the rack, the movable jaw may slide along on the shank till it nearly approaches the required position.

A spring catch in the end of the worm pivot engages with a suitable recess in the projection, B, to lock the pivot in its place, when the worm is in the position shown in Fig. 1; and a thumb piece is used to press back the catch when the worm is to be thrown out of gear, as in Fig. 2. When, however, the jaw is to be moved only a small distance, the worm is used in the usual manner.

The thread of the screw nearest the neck in Fig. 2, is beveled so as to readily enter, the rack, which latter is cut in a rib extending the whole length of the back of the shank.

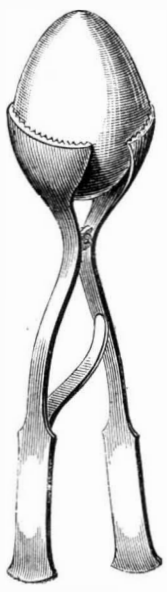
The wrench, in addition to the facility it affords for rapid adjustment, is strong and light, and, we should judge, durable.

It was patented Nov. 22, 1870. For further information address Conrad Cline, Martinsburg, West Va., or Peter Burress, Braidwood, Ill.



BURRESS AND CLINE'S IMPROVED SCREW WRENCH.

EGG TONGS.



Mr. W. F. Hellen, of Washington, D. C., has patented, in this device, a very convenient and graceful table implement, by which hot boiled eggs may be handled without injury to the fingers.

The accompanying engraving shows the device so clearly that no explanation is needed. Lovers of hot boiled eggs will find this article a great addition to the luxury of eating them as hot as desired, as by their use, an egg may be held without discomfort; and the end of the shell being removed, the remainder of the shell forms a cup in which the egg may be seasoned and prepared for eating. Another advantage is, that the fingers need not be soiled by the contents of the shell, when eggs are eaten, as they always ought to be, soft boiled.

American Iron Ships.

The Wilmington (Del.) *Commercial* states that on the 11th March, the ship-yards of Wilmington sent away a splendid iron sea-going steamship, of over 1,600 tuns capacity. On the 18th inst., they sent away another iron steamer, intended for the Chesapeake Bay service, of about 500 tuns. Three more iron vessels are now being built in the Wilmington yards, one of which will be a heavy sea-going steam propeller, of 2,000 tuns or over, intended for the Boston and Baltimore trade; another is a Government steamer, built under contract with the Treasury Department; and the other a lighter, of comparatively small tunnage, intended for South America.

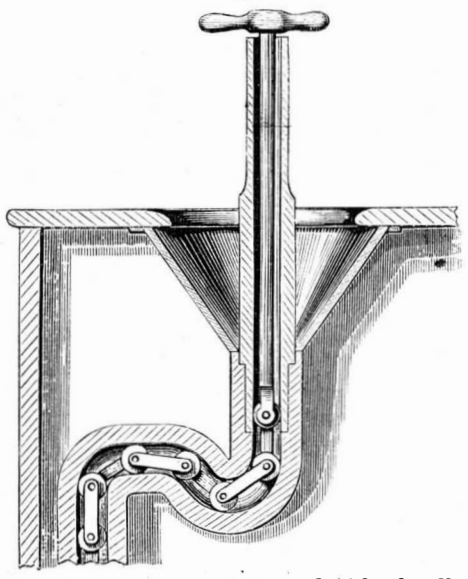
It says that the Wilmington yards can build the like of any ocean steamer now in use, except the *Great Eastern*, and can do the work well and promptly, and adds that they have built more iron vessels than all other yards in the United States put together, which we believe is the fact.

The Denver Artesian Well.

The Denver *News* gives an interesting account of the progress, difficulties encountered, and encouraging prospects of the artesian well, commenced last summer on one of the hills east of the city. The necessary tools, engine, and men were procured, a shaft sunk to the bed rock, and boring commenced. At 250 feet the water rose 80 feet. The strata passed through, being a soft soapstone, there was great difficulty from caving, but the bore was carried down to 430 feet, when casing became indispensable. Two hundred and sixty feet of casing were ordered and put in without trouble, but more was necessary. Two hundred feet more were ordered, but were two months in arriving. Then, after great trouble and some delay, enough casing was put in to make 396 feet, when a slide deflected the column one joint above the lower end. Then came more trouble in straightening it; then came the cold December snap, freezing up everything. Since the weather moderated, the pipe has been straightened and boring recommenced. At 530 feet the soapstone was passed, and a stratum of fine-grained sandstone entered. With it came a powerful stream of water, filling the well 300 feet. Then came more caving, and drilling had to stop at 535 feet. The casing was afterwards driven nine feet, and will be pushed down and drilling recommenced. The water has risen to within 120 feet of the surface, high above the streets of Denver, and is pure and soft. It is believed that 250 or 280 feet further will give a flowing well. The work so far has cost $6,000, and a few citizens have borne the burden. At a meeting of the subscribers it was resolved to ask the city and county each to contribute $3,000 to complete the work. Considering the public benefit conferred if the well be a success, as it seems likely to be, there is little doubt that the city and county both will help the enterprise through. The same machinery will be available to sink many wells in different parts of the country, providing this be carried to a success.

DEVICE FOR CLEANING TRAPS IN SOIL PIPES.

Considerable trouble is often experienced in cleaning the traps of water closets, soil pipes, etc., when they have become clogged. Our engraving shows an ingenious device for this purpose, invented by James Wright, of New York city, and patented in June, 1867. It consists of a series of links, with



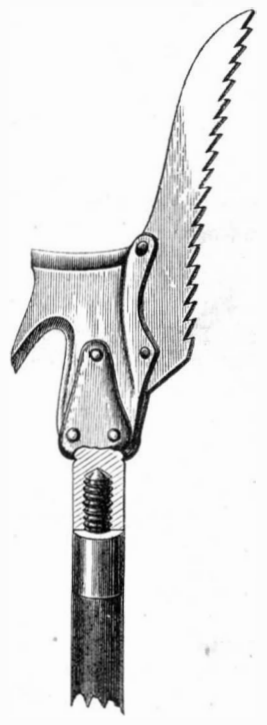
friction rollers at the joints, connected with a handle which works through a vertical tubular guide. This is a useful implement. Its operation is so well shown in the engraving that further description is unnecessary.

Curiosities of Genius Relating to Inventions.

It must be taken, we suppose, as a proof of the versatility of genius, that we always find that the professions and trades of these intractable inventors have not the remotest connection with their valuable mechanical, chemical, and warlike discoveries. Thus, a clergyman may send breech-loaders and tremendously destructive shells, while the nurseryman and market-gardener proffers improvements in surgical instruments, and the doctor a contrivance for forwarding the ripening of fruit on walls. One grocer demands space for the exhibition of a new axle, applicable to all carriages, a new projectile for ordnance, and a new method of propelling ships. An M. A. and F.R.G.S. has models of an invulnerable floating battery, a breech-loading gun and carriage, a means of converting guns of old pattern into breech-loaders, a refuge buoy, a beacon, a cork poncho mattress, a life, limb, and treasure preserver, an unfoulable anchor, and some new screw propellers. An accountant asks space for a model of a self-acting water-closet, with water, meter, and apparatus for regulating the flow of water, all in one; the model of an improved theodolite, and an omnitonic flute, all to be shown together! A bookseller seems overflowing with invention. He has a plan of interminable suspension, applicable to bridges, aqueducts, etc., of great span or length, and by which he means to do away with the costly supports hitherto used; a target-shooting protector for the safety of those employed to note the score; a new paddle-wheel, by which to secure a greater amount of power than is attainable by any other arrangement; a self-acting railway signal, for day and night, and bolts for gates at level crossings, whereby to prevent the gates from being opened while a train is within a quarter of a mile, or any convenient distance; a safety-spring mining cage, to secure the safe lodging, or prevent the falling, of the cage, in its ascent or descent, when conveying men or goods up or down the mine shaft, should the rope or chain break, or become disarranged; a new window sash fastening and door bolt, by which to attain perfect security, from the impossibility of unfastening them from the outside. A barrister wishes to exhibit two architectural designs; a pair of spring-heeled boots, and a drawing of a man equipped with them; diagrams of Coryton's system of fairway lighting off the coasts of Great Britain; a type-composing machine and hand-stamp; models and drawings illustrative of Coryton's atmospheric guide propeller, and Coryton's self-adjusting sails. An insurance broker has specimens of wines and other fluids, fined by a new and more effective process, and a model of the apparatus used; electric telegraph cables and conductors; model of an improved ship, and of parts thereof; specimens of improved pavement in carriage roads; specimens of improvements in iron houses, etc.; specimens of building stone, preserved by a new material; model of a machine for dressing stone; specimens of improved junctions of iron pipes, to prevent breakage; specimens of a new description of embroidery; specimens of paper hangings; specimens of an improved floor cloth. These, likewise, are all to be shown together.

[We find the above in one of our exchanges, and we can fully confirm the correctness of the theory, that inventions intended for a specific trade are most apt to originate with those who have no connection with the business—mere lookers on, who see what is needed more than they feel it.

COMBINED PRUNING HOOK AND SAW.



This combination is a useful and convenient one. The saw is used to sever such branches as are too large to be cut off by the hook, and the tool, when placed on a handle of proper length, will save a vast amount of laborious climbing, in the pruning of fruit trees. The engraving well illustrates the form and construction of the implement. It is the invention of Jeremiah Schroy, of Fortville, Ind.

Such inventions as this, which require neither large ingenuity in the devising, nor large capital in the manufacture, if they combine usefulness with cheapness, scarcely ever fail to reward their inventors. The little things that a great many want, pay better than the large ones that are only required by a few.

Malt Without Germination.

The process of malting, as is well known, consists in steeping barley in moisture till germination has commenced, and then roasting the malt to arrest the growth. When done, the product easily yields, to water, a saccharine principle, making a sirup or "wort," easily fermentable; and when fermented, giving a large proportion of alcohol. The time taken in malting, and the troublesome nature of the some what delicate process, has led many chemists to search for means of producing a wort artificially, but as yet the organic matter has defied synthetical imitation. But a new invention is announced, by which a wort can be produced from barley, without germination. The process is as follows: The barley (fifty parts by measure) is put into a vessel, and steeped in thirty parts of sulphuric acid diluted to one per cent; the vessel is then covered lightly, and placed in a water bath, kept at a steady temperature of 105° Fah. The vessel must be left in the water bath for seventy-two hours, and the contents frequently stirred to insure contact of the acid with all the barley. At the end of the process of steeping, the barley becomes soft and easily crushable, the silica in the bran being destroyed by the acid. It should be dried, and then has the appearance and smell of malt, and, we are assured, makes an excellent wort. The saving of time and trouble are altogether in favor of this process, which the inventor, Dr. Fleck, of Dresden University, has lately discovered, and on which he is now laboring with a view of rendering it easy and practicable on a large scale.

DRILL LUBRICATOR.—In drilling wrought iron, use one pound of soft soap, mixed with a gallon of boiling water. This is a cheap lubricator; it insures working with great ease, and clean cutting by the drill.

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Correspondence.

The Editors are not responsible for the opinions expressed by their Correspondents.

Dangerous Oils vs. Dangerous Lamps.

MESSRS. EDITORS:—I notice on page 148 of present volume, that Mr. Chas. B. Mann aims a blow at glass as a material for kerosene lamps. He has hit the nail on the head. So long as the low value of the light petroleum fluids offers large inducements to cheat, all legislation will fail to protect us from the horrors of kerosene burning. Of all substances, glass is the most unfit for kerosene lamps. A large portion of the accidents which result in death, are caused, not by explosions, but by the accidental breaking of glass lamps, which may occur in a thousand different ways.

Another large class of accidents, though but little understood, are those resulting from unequal expansion of the glass by heat. Being a very poor conductor of heat, the large amount generated by the burner is concentrated around the collar and top of the lamp, while the lower portion remains cool, causing the heated portion to expand, producing fracture. The lamp falls in pieces, and the overheated oil ignites.

Experiment also proves, that in a glass lamp, the heat, which cannot escape, is conducted by the oil in the wick down into the body of the oil, raising the temperature many degrees above that of the outside of the lamp, or the surrounding atmosphere; while in a metal lamp this heat is spread over the whole surface, and is rapidly dispelled by the air, leaving the oil cool. In order to test this matter, I placed, side by side, a glass and a metal lamp, containing the same kind of oil, and using the same kind of burner; the other conditions being as nearly as possible alike. After burning two hours in a room, at 71° Fah., I introduced, through the feeder, the bulb of a thermometer into the oil. In the glass lamp, the mercury indicated 104°, while in the metal lamp it only indicated 79½°. The collar and a small portion of the glass fount were very warm, while the main portion of the glass was cool; showing that the temperature of the glass is no indication of that of the oil within.

Many of the burners now in use conduct downwards but little heat, while others conduct an amount sufficient to bring almost any oil up to the flashing point. No glass lamp is safe from accident. I have known a shuttle to fly from a loom, breaking a glass lamp, and setting fire to the mill, which was saved only by the flames being smothered with a large amount of valuable cloth which happened to be handy.

For household purposes, I believe the rule I have adopted, at my house, to be safe. I have one or more lamps in each room, on stationary brackets, out of the reach of children, and only use one lamp to carry about the house. These lamps are all metal, and cost but $3 per dozen, and are more ornamental than my old glass lamps, costing three times that amount. I believe them to be absolutely safe. My cans are so constructed that the oil, in filling the lamp, is filtered through sand, so that no fire can possibly communicate with the interior. Give us safe, cheap, metal lamps and safe cans, and, in spite of legislative failures, we shall be comparatively safe. J. B. FULLER.

Norwich, Conn.

Petroleum Dangers.

MESSRS. EDITORS:—I am glad to see that petroleum dangers are at last exciting the attention they deserve; and it is to be hoped that we shall soon have the proper remedies. I had intended to write an article on the subject, but your last correspondent, Mr. Mann, of Baltimore, has nearly saved me the trouble, by expressing my views exactly: namely, that all petroleum oils are likely to generate an explosive vapor, when long confined with a vacuum above them, and subjected to a moderate heat; and that although thousands of gallons of positively dangerous oils are daily sold by ignorant and villanous dealers, yet the lamps in common use are as much at fault as the oils, as disasters have occurred with the best of oils. Now this state of things, I think, can be easily remedied, and I would offer the public a few suggestions:

First. Let us have lamps so constructed as to be as far as possible proof against accidents, and on such principles that any oil may be burned in them with perfect safety by careful and intelligent persons. Second. Let us have legal enactments, forbidding, under severe penalties, the sale of all light and volatile oils, for domestic purposes, and requiring all retailers to have their stock inspected, and proved to be unignitable at 110° Fah. Third. Let benzine and all the volatile products of our oil wells be used in specially constructed lamps for street lights, light-houses, etc., superintended by careful and competent hands, and in situations where, if an accident did occur, it could do no great damage.

I have frequently used pure benzine, with great success and economy, for light and for cooking meals, taking great care to have my lamp so full as to leave but little vacuum, and having the wick so tight that the flame could not pass down it; and never letting the bowl get above 80° Fah. But, though I could do this with perfect impunity, I should consider myself a murderer if I introduced such a practice to the public, as the world always will be full of people too stupid or careless to be trusted with even tallow candles.

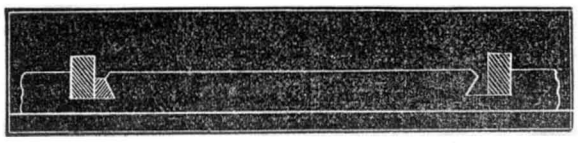
Now, I would point out some of the defects of our common lamps. Fragile glass bowls, mounted on high stalks often slightly fastened to narrow bases, itching to be knocked over and broken; short wicks passing loosely through short tubes, the flame only an inch above the bowl, in the top of which explosive vapor more or less always accumulates, as the oil heats and exhausts, the looseness of the wick giving free passage from the flame to the vapor: these things seem to be a combination peculiarly designed to invite disaster. I also object to the nicked wheel in the tube; though very convenient for turning the wick up or down, it will not work when the wick is tight enough to prevent the flame from being conducted downwards by the ascending vapor. A simpler and safer plan is to have the top of the burner, with the chimney, to swing over on a hinge, when the wick can be regulated with a pin or an awl.

With better lamps and good oil, the world may use petroleum, and suffer no more from it than it did in past times from tallow. LINDON PARK.

Brady, Pa.

Wooden Railroads.

MESSRS. EDITORS:—In your valuable paper of February 4th, in the "Correspondence" column, I notice that you would like to hear more in detail about the wooden railroad. We built, in 1865, a wooden railroad, $3\frac{82}{100}$ miles in length, to transport coal, by mule power, to the Ohio River, near Rockport, Ind. The cross ties were mostly split out of white oak, from 7 to 7½ feet in length; and the notches were sawn with hand saws, as shown in engraving. They were cut straight down on the outside, and bevel and taper inside, to keep the keys in their places, if they should get loose by shrinkage.



We placed the ties from 2 to 2½ feet from center to center. We used the best white-oak rails 3 × 6 inches, and keyed them in with oak, so that the bevel space was filled.

The cars used on this road had 24-inch wheels, 4-inch tread. 1½ inch depth of flange, and 2½ inch axles, run in cast boxes lined with Babbitt metal. The weight of car was about 1,500 pounds, to carry 60 bushels coal—4,200 pounds (the Indiana bushel is 70 pounds); in all about 3 tuns per car. The cars ran smoothly and easily for six months, when the rails began to get soft, and to splinter for a quarter of an inch of depth. They were much the worst where the sun shone on them, during the summer months. About two miles of this road was through timbered land, and the rails in the shade lasted much better than those exposed to the sun.

The next trouble we encountered was in frosty weather; the splinters or mashed wood would stick to the wheel, and wind around it like rope, until it would run out with the grain of the timber, or break off at a knot.

In less than twelve months the road was rough, and we turned the rails, and replaced some with new ones. Some of the rails were worn down more than an inch, leaving the knots nearly full up to the first measure. This made a rough road; and we concluded to try flat bar iron. We sent for ten tuns 1½ × ⅝ inches, countersunk and punched for ¼-inch spikes. This worked so well that we put iron on the full length of road.

By using iron on the rails, we gained as follows: 1st. On the wooden road we had to keep two or three men to keep it in order; as soon as the iron was on, one hand did the work, and had half his time for other work. 2nd. One mule would do as much work as three would do on the wooden road, and the rails would last about four years, or until they would rot and not bear the weight of the cars.

The vein of coal at this place being about worked out, we opened a vein near Yankeetown, Warrick county, Ind. This vein is about 20 feet above the Ohio River at high-water mark, and 8,530 feet from its bank. We built a road to the river last summer and fall. About 6,000 feet of this road is trestle work, on river bottoms, from 3 feet to 16 feet high, 10 feet span, 20 feet string timber (6 × 11 in white oak.) The old flat bar iron and cars are used here. We used a piece of flat bar iron, about 18 inches in length, alongside of the flat bar at every joint, so that the ends of the iron are not mashed down into the timber to make it rough. This road is properly graded, the steepest grade with the loaded cars being 9 inches to the 100 feet. Three mules bring five cars up this grade, which is on trestle work, 10 feet high, planked with 2-inch lumber. We are not in full operation yet, but expect that one team of three mules will haul from 2,000 to 2,500 bushels per day to the river. We shall put on a small engine, as soon as we are able and find one to suit us. A six tun engine would do our work, we believe.

The flat bar iron cost us near $1,100 per mile; tires, about 12 cents apiece—we used our own timber. (Cutting ties cost 5 cents; sawing notches and trimming out, 5 cents, hauling out of woods, 2 cents.) We had to purchase some oak lumber, not having enough on our land. Price paid was $16 per thousand, delivered along the road. We used near 325 thousand feet of lumber, on the road and a few miners' shanties. Our vein of coal is from 4 feet to 4 feet 2 inches thick (what miners call "blasting coal.")

All that we can say to those building wooden railroads is, they will not be long in using flat bar iron on their roads; by so doing, they will save many a dollar in the way of repairing rails, etc.

Narrow gages and light T iron will take the place of the wooden roads in a short time, if cheap railroads are wanted. The T iron is a little more expensive at first, but in two year's time it will pay for the difference in keeping the road in order. J. M. SPEER, SR., & SONS.

Warrick county, Ind.

Payne's Electro-motor.

MESSRS. EDITORS:—From the interest I feel in the production of an "electro-magnetic motive power," I am induced to say a word in relation to the article which appeared in the *Telegraph Journal;* and I was very properly placed in doubt by your article of the 11th inst. In the description given by the writer who was privileged to see the wonder that is to turn the world upside down, he distinctly states that there were five magnet cores equidistant in the fixed ring, and six in the revolving set, thereby avoiding any dead center. Now any person giving such an arrangement a little attention, will readily come to the conclusion that there must be a dead center in any and every possible position; therefore the engine's moving at all can only be accounted for by supposing that it was, in some way, coupled to the source of power which drove it, which would, at the same time, solve the problem of the brake. It would not be very difficult to ship and unship a coupling by means of the electro-magnet.

Montreal, C. E. POLAR.

A Circular Saw Eighty Years Old.

MESSRS. EDITORS:—Mr. John Coop came into our factory to-day with an old rusty circular saw, about 16 inches in diameter, 18 gage, with four cross-cutting teeth to the inch, and a one inch and a quarter square hole in the center Mr. Coop says that he made the saw; that is, he sent to Birmingham for the steel, and cut out the saw, and filed the teeth in it, in a dockyard in England, eighty years ago; he says he used it for sawing, running it in a lathe, and calling it at that time a "fly saw." Mr. Coop is now nearly 95 years of age, and made this saw when a boy of about 14 years old.

The old gentleman claims that this is the first circular saw that was ever made in England. I tried to purchase it from him, but he would not dispose of it. He wanted it cleaned up, as he said, to carry to Florida with him, saying that when he dies he means to have that saw with him. Mr. Coop is certainly a rare specimen of longevity and perfect health; he has always lived temperately; eats no meat, never was married, and never has seen a sick day.

Pittsburgh, Pa. J. E. EMERSON.

How to Select Right or Left Hinges Instantly.

MESSRS. EDITORS:—The following simple method of selecting right from left-handed loose jointed butts or hinges, may be useful to many of your readers, as it has often saved me considerable trouble and annoyance in sending inexperienced persons to the stores for such articles: Take up the closed hinge from the counter, and open it from you, holding it in both hands; if you wish for right handed ones, hold fast with the right hand, letting go the left. If the hinge remain intact it is right handed, but if it fall to pieces, or apart, it is left handed. Holding fast with the left hand and letting go with the right, will prove which are which, by a similar test.

I have seen many a score of people puzzled to tell one hinge from another, until I showed them the above simple plan, when it was a mystery no longer.

Eastport, Me. W. A. MACKENZIE.

[For the Scientific American.]

WHAT BECOMES OF ALL THE STEEL PENS?—THEIR MANUFACTURE.

When at the works of Messrs. Thomas Jessop & Sons, in Sheffield, Eng., I was informed that *six hundred and thirty-one tuns* of sheet steel was manufactured and sold in 1868, to be manufactured into steel pens. I was about writing home, and dared not give the quantity, fearing that I was misinformed. Next day I returned to the office, and the clerk turned to the books and showed me the exact figure, which was something over 631 tuns. This is from one establishment, others making steel for pens also. Each tun of steel averages about 1,000,000 pens, making a total of 631,000,000.

What becomes of all the steel pens? Is it not reasonable to presume that the most of them are thrown away? How common it is to pick up a steel pen, the nibs of which are stuck together, to pull it out of the holder and throw it into the stove, and put in a new one! Then this is too soft, or too stiff, too fine, or too coarse, or does not make a fine hair line. For the least trifling fault, it shares a similar fate; and a trifling vexation often empties a whole box into the waste basket. Nobody considers the cost of a steel pen. Well, that's where the most of them go.

Now, this enormous and almost incredible quantity of steel for pens excited my curiosity, and I was curious to see how they were made in England. I took a letter of introduction to Mr. Gillott, and, calling on that gentleman, at his manufactory in Birmingham, was cordially received by him in person; and I was conducted through every department of his immense establishment, employing 600 operatives, mostly women, turning out about 20,000 gross of steel pens daily, comprising, at that time, thirty-three different varieties. First, the sheet steel, as it comes from the steel works, is cut into strips, generally wide enough for two pens in length; the scale is removed by acid, and the steel cold-rolled into strips. One of these strips is now seen feeding into a machine, which first stamps the name on it; at the next move it is under the die, and cut out into flat blanks. These are then formed into proper shape, by dies in a drop press, one by one. They are then taken to the tempering room, placed in small sheet-steel boxes, holding about a pint, and heated in a furnace to a cherry red; then poured into a hardening bath of an oil mixture, falling into a perforated dish. The bath is raised, the oil drained out from among them, and they are wiped clean. Then they are put into a regular coffee roaster (as I called it), holding about half a bushel, and turned slowly, by a hand crank, over a slow charcoal fire, until they are of a proper spring temper. They are then placed in tin cans, holding say half a bushel, and these cans are put into frames, and run by belts, like a tumbling barrel, until the pens are polished, and all the sharp corners worn off. They are then

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ground and polished at the points, on one of the most ingenious little machines that I ever witnessed in operation. A small iron cylinder, or wheel, is running horizontally, with a slow motion; a grindstone is also running horizontally, with its edge close enough to the cylinder to grind each point, as it turns past its face; next is a polishing wheel, running in the same direction and position, polishing the pen as it passes. By an ingenious little spring contrivance, the pen is held until it passes the grinding and polishing wheels, when it is let go, and drops into a box. The operator stands and drops them into the receptacles as they pass.

The next operation is slitting the points; this is done after they are tempered. The instrument used for this purpose is similar to a pair of shears. The pen being placed in a guide by hand, the slit is made just deep enough to cut through the steel and allow the points to spring into place again.

Mr. Gillott claims to be the original discoverer of the process for splitting the pen after it was tempered, performing that operation, in a secret room, for years before the process was discovered by others. He commenced life as a penknife grinder, and by this simple discovery was led to fortune. Slitting them while in a soft state, as was formerly done, left the points open, so that it was necessary to close them by hammering, a most tedious and costly operation.

Mr. Gillott informed me that he imported all of his finer quality of paper from France, for the covering of boxes, as it was not manufactured in England. This establishment consumes about 150 tuns of steel per year.

Mr. Gillott, noticing my fondness for mechanics, called a workman and had him take apart several ingenious machines, explaining to me the several parts. This liberality I very much appreciated. J. E. E.

THE WORKING OF THE NEW YORK FIRE DEPARTMENT.

A writer in the *Evening Post* gives a very interesting account of the successful working of the New York City Fire Department.

In 1860, the amount of home and foreign fire insurance capital in this city was $32,000,000. In 1870 it was $51,000,000. The ratio of fires was greater under the old volunteer, than under the new paid system, which went into operation in 1865. Each engine house has one steam fire engine, with two horses; and one tender, with one horse, to carry hose, fuel, and apparatus. Each of these houses has a company of twelve men. They are provided with comfortable lodgings within the houses, and are, night and day, in constant attendance, except when at meals, which are taken near at hand. It provides the requisite hook and ladder companies of twelve men each, with the same quarters and regulations.

There are now 45 engine houses and 15 trucks for hook and ladder use, making a force of 165 horses and 720 men. There are 5 commissioners, who control the department, a central headquarters, chief engineer, secretary, medical officer, telegraph alarms, bureau of combustible materials, and firemen's library. To these officers are to be added 10 district engineers and 1 chief assistant, who devote their entire time to the service.

THE FIRE TELEGRAPH.

The system of telegraphy in use is the patent of John N. Gamewell, but the machinery to carry out a more perfect system for this city—the batteries and automatic street boxes—are the invention and patent of Mr. Charles T. Chester, one of the most accomplished electricians. Colonel Stephen Chester, of the Potomac Army Engineers, directed the surveys and the erection of the lines to complete it. The entire work—posts, wires, and machinery—cost about $600,000. There are 84 stations, including engine houses, insurance patrol stations, and officers' quarters, to which to send messages, and 540 street boxes, from which alarms of fire may be sent to the central office. The telegraph alarm apparatus, under the hand of a good operator, works with a rapidity and certainty before unknown in electrical apparatus. It consists, in brief, of three parts:

1. A receiving apparatus, which has the capacity to receive and note 56 alarms of fire, from all parts of the city, at one and the same time. With this apparatus the modern hotel annunciator is so connected, that it instantly drops a figure, showing the line of wire over which the alarm is coming, and at the same instant marks, upon a coil of paper, the number of the station. Each of the 56 wires, which together cover the whole city, includes a given number of stations, and it required great skill to arrange them that they do not interfere one with another, since a part or all might be in use at the same time. Fifty-six pens, moved by 56 relay magnets, are arranged under this coil of paper. Each pen and magnet is connected with some one of these 56 wires. The street boxes are so arranged that, when an alarm is to be sent to the central office, the current of electricity, which always flows through the line, may be broken so as to cause the discharge of any one of these little magnets. This works 4 results in the receiving apparatus at the office, namely: strikes a loud gong or bell, throws into view the number of the wire on which the alarm comes, starts the register wheel, and marks the number of the box where the alarm is made.

2, A transmitting apparatus, equally beautiful, instantaneous and perfect in its work.

3. An apparatus for testing the condition of all these wires; for discovering at once in the office any break or injury within a few yards of its actual locality; or for testing the connection of any of these lines with exterior lines going out of the city.

At all times, night and day, two operators are on duty at the central office. When an alarm is given, the precise engines and trucks which should answer know it. If the fire spreads, and a second alarm is given, those who should respond know it; and so of a third, which brings into action all the force that can possibly be required.

RAPIDITY OF THE SERVICE.

The horses are all selected, groomed, and kept in the best manner. They are kept in sufficient force already harnessed, and so surprising is their instinct and so admirable their training, when the electric gong strikes in the engine house, they back instantly from the stalls into position before the engine, the doors are flung open, and the engine starts on an average in 22 seconds after the alarm is received, often in 18. An alarm, reaching the central office, is transmitted to every engine house, patrol station, and officers' quarters' all over the city, in 45 to 50 seconds. If we add to this instant movement and rapidity of execution, the most perfect fire apparatus which modern science and skill can devise, the unflagging power of steam, an enlarged and skillful method of instructing the officers and men in classes, which General Shaler, president of the Board, has personally introduced, the effective power of this small force stands in bold relief over that of the volunteers when they numbered even 3,800 men.

The causes which elevate and give a higher moral character to the new force are equally effective. The lyceum, in the hall of the central office, now contains a valuable library of 6,000 volumes, the gift of underwriters and private citizens, comprising largely choice biography, travels, history, and practical science, from which all the members of the force can draw and use. Dr. Charles McMillan, the medical officer of the Board, has done much to this end, in his strict examination for admission to the force, in rejecting men of bad habits or physically unsound, and in maintaining a system of competitive examination for promotion, which rests on merit alone.

LOSSES BY FIRE.

The following table of losses by fire from 1866 to 1870 shows unmistakably the good financial results of the system:

	No. of fires.	Loss.
1866	796	$6,428,000
1867	873	5,711,000
1868	740	4,142,000
1869	850	2,626,000

Of the 850 fires in 1869, 807 were confined each to one building, showing the promptness and efficiency of the efforts to subdue them.

The cost of maintaining the present service is about $950,000 per annum; a sum well invested, when we compare it with the immense losses to which we are exposed, and keep in view the growing intelligence, manly habits, and pride of character which the discipline of the organization most seduously fosters. It is most favorable, when compared with the service and the cost of the old volunteer department. The direct cost of that, per annum, was above $500,000, but the indirect expense in other forms was proved before a committee of the legislature to have swelled the sum to rising $1,000,000. The above table, from the careful reports of the insurance department, shows a reduction in losses, from 1866 to 1869, of $3,800,000; and the losses in 1870, since the new charter went into operation, were $506,000 less than in 1869, while the moral and effective character of the force has improved more than in any previous period.

Is the Interior of the Earth Solid or Fluid?

Although the doctrine that the earth is a molten sphere, surrounded by a thin crust of solid matter, was once almost universally taught by geologists, there have of late years been brought forward several arguments to the contrary, which, apparently, are more in favor of its being a solid, or nearly solid mass throughout; and these arguments are fully entitled to our consideration, as our object is not to defend any particular theory, but to arrive, as nearly as we can, at the truth. I will, therefore, in the first place, proceed to scrutinize all which has been brought forward in opposition to the older hypothesis, and then to consider whether any other explanation yet advanced is more in accordance with the facts of the case.

First of all, we are to answer the question as to whether it is possible for such a thin crust to remain solid, and not at once to become melted up and absorbed into the much greater mass of molten matter beneath it? This latter would doubtless be the case, if the fluid mass had any means of keeping up its high temperature, independently of the amount of heat it actually possessed when it originally assumed the form of an igneous globe. The question, however, in reality answers itself in the negative, since it is evident that no crust could even commence to form on the surface, unless the sphere itself was at the moment actually giving off more heat, from its outer surface to the surrounding atmosphere, than it could supply from its more central parts, in order to keep the whole in a perfectly fluid condition; so that, when once such a crust, however thin, had formed upon the surface, it is self-evident that it could not again become melted up or re-absorbed into the fluid mass below.

This external process, of solidification due to refrigeration, would then continue going on from the outside inwards, until a thickness of crust had been attained sufficient to arrest, or neutralize (owing to its bad conductibility of heat) both the cooling action of the surrounding air and the loss of more heat from the molten mass within; and thus a stage would soon be arrived at when both these actions would so counterbalance one another, that the further cooling down of the earth could be all but arrested: a condition ruling at the present time, since the earth-surface, at this moment, so far from receiving any, or more than a minute amount of heat from the interior, appears to depend entirely, as regards its temperature, upon the heat which it receives from the sun's rays.

We have next to consider the argument that, if the earth's exterior were in reality only such a thin covering, or crust, like the shell of an egg, to which it has often been likened, that such a thickness would be altogether insufficient to give to it that stability which we know it to possess, and that, consequently, it could never sustain the enormous weight of its mountain ranges, such as, for example, the Himalayas of Asia, or the Andes of America, which are, as it were, masses of rock piled up high above its mean surface-level.

At first sight, this style of reasoning not only appears plausible, but even seems to threaten to upset the entire hypothesis altogether. It requires but little sober consideration, however, to prove that it is rather, so to speak, sensational in character than actually founded on the facts of the case; for it is only requisite for us to be able to form in our minds some tangible idea of the relative proportion which the size of even the highest mountain bears to that of the entire globe itself, to convince us, if such a crust could once form and support itself, that it could with ease support the weight of the mountains also. The great Himalayan chain of mountains rises to a maximum altitude of 31,860 feet, or six miles above the level of the sea; and if the earth could be seen reduced in scale down to the size of an orange, to all intents and purposes it would look like an almost smooth ball, since even the highest mountains and deepest valleys upon its surface would present to the eye no greater inequalities in outline than the little pimples and hollows on the outside of the skin of an ordinary orange. If this thin crust of the earth can support itself, it is not at all likely to be crushed in by the, comparatively speaking, insignificant weight of our greatest mountain chains; for, in point of fact, it would be quite as unreasonable to maintain such a disposition, as to declare that the shell of a hen's egg would be crushed in by simply laying a piece of a similar egg-shell upon its outside.

That a very thin spheroidal crust, or shell, enclosing a body of liquid matter, such as an ordinary fowl's egg, does possess in itself an enormous degree of stability and power to resist pressure from without, is easily demonstrated by merely loading a small portion of its surface with weights, as long as it does not give way under them. Even when placed on its side (or least strong position), it is found that a portion of the shell, only one quarter of an inch square, will sustain several pounds weight without showing any symptoms of either cracking or crushing; or, in other words, this simple experiment indicates that if the external crust of the earth were but as thick and strong in proportion as an egg-shell, it would be fully capable of sustaining masses, equal in volume and weight to many Himalayas, piled up one atop of another, without any danger whatever to its stability.—*Extract from a Lecture by David Forbes, F. R. S.*

The Revenue of the Patent Office.

For several years past, the funds received at the Patent Office, from inventors, for the transaction of their business, have been, by act of Congress, turned over to the Treasury, and the Patent Office sustained by specific appropriations, yearly made for that purpose. We desire to call attention to the injustice and unfairness of this matter. The Patent Office is not only a self-supporting office, but its revenues are large and flourishing, and steadily increasing. Transferring to the Treasury, the moneys received by this bureau from inventors and other applicants for patents, is raising revenue from a source whence it should not be done; while appropriating from the Treasury to sustain the Patent Office, tends to create the impression that it does not support itself.

The money paid to this office is not a legitimate source of revenue to the Government. It comes from individuals, and is paid into the exchequer of the Patent Office for a specific purpose, that of facilitating the business of these individuals. It is unjust and unfair to divert a cent of it for other purposes. In our opinion, all the moneys received at the Patent Office should be used solely to carry on the business of that office, and to give increased facilities for the transaction of that business.

As the law now stands, we apprehend there is more of delay and obstruction in the dispatch of current work in this office, than there should be. The office is crowded for want of room, and inventors are compelled to wait for months ere their affairs are brought to a final and successful termination. The Commissioner of Patents and his entire force of assistants devote themselves with unusual and most commendable energy and faithfulness to the prompt and speedy performance of their duties, but they find it a matter of impossibility to proceed as fast as they desire, and as rapidly as the necessities of the work demand.

Every application for a patent, or claim for an extension, etc., should be made almost immediately upon its being filed in the Patent Office, thereby assisting inventors and tending to increase the business of the office. If the Commissioner of Patents were empowered to retain and disburse, as the necessities of the office demanded, the moneys received therein, the speedy transaction of business would be insured. And we think Congress should look into this matter, and change the present mode of transferring Patent Office funds to the Treasury. Its revenues should be expended solely upon itself, and should not be diverted to any other purpose whatever.

[We copy the above remarks from the *Republican* (Washington city), and are glad to find that influential journal interesting itself in Patent Office reforms. The suggestions are worthy of consideration.

THE Glue Works, at Peabody, Mass., manufacture 2,260,000 lbs. per annum.

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Knapp's Dovetailing Machine.

This machine is called a dovetailing machine, yet, although it makes an admirable substitute for the dovetail joint, the work it performs cannot strictly speaking be called dovetailing. The joint made by it is shown in the details at the bottom of the accompanying engraving. This joint, which is a combination of scollop and dowel work, will, we think, commend itself to all mechanics who examine it, as not only elegant in form and appearance, but strong, durable, and easily put together. It, therefore, matters little what name is applied to it.

The machine which does this beautiful work is extremely neat and compact, only occupying about a square yard of floor room. It receives its power from a belt passing over the tight and loose pulley, A, on the lower shaft, B, on which are a flange pulley, and a twenty-inch pulley, that, in connection with two arbor pulleys, runs a portion of the cutting tools.

On the upper shaft, C, is a pulley, connected by a belt with the flange pulley, and two cams, D and E. The cam, D, moves the tools into and from the stock being worked, while the cam, E, with a pawl attached, plays in a ratchet at the base of the sliding table, F, on which is placed the stock, moving it along to receive the operation of the cutting tools. On this table are placed four pieces of drawer stock, two fronts and two ends, which are securely held in their positions by means of the four compression screws, G G G G. This table carries along the work of two drawers at a time, taking drawers from eighteen inches in depth down; on this table are arranged groove gages, adjustable to the various sizes of drawer.

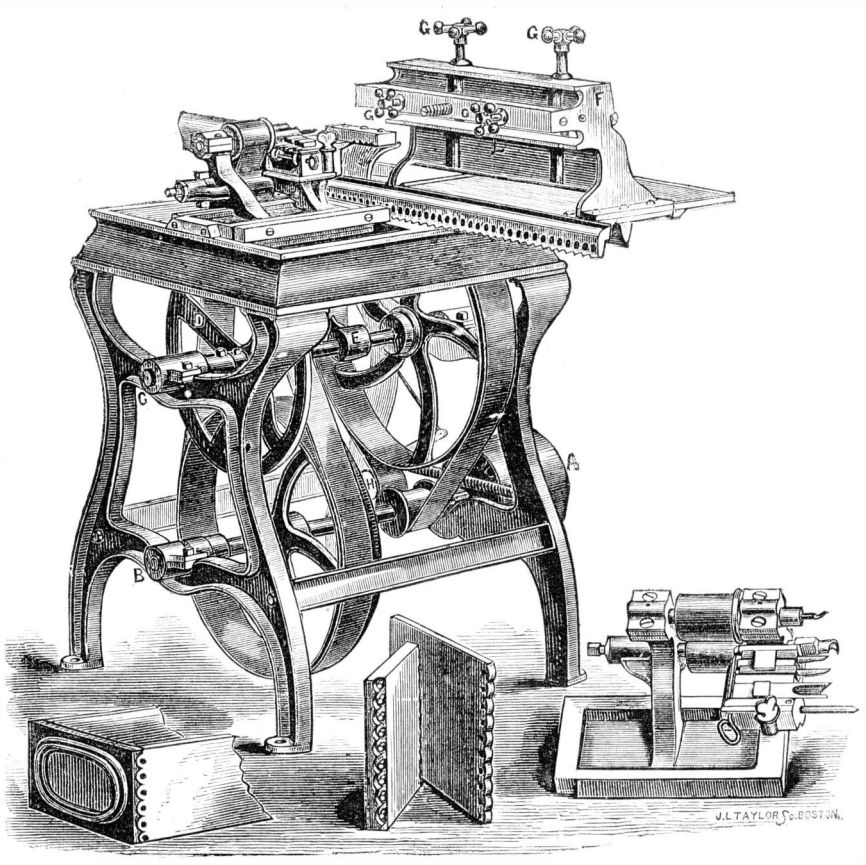
H is a binder pulley, worked by a cam and spring, which operates to stop the movement of the tool carriage, I; this carriage contains on the lower tier, a hollow augur that cuts the spindles on the fronts and backs of drawers, and on the upper tier, four tools to cut the ends, a bit that cuts the holes in the scollops, followed by two V tools and a gouge that form the scollop. The three latter tools are on an adjustable head, which may be thrown back or entirely removed while the pins and holes are being made for the backs of the drawers, or for any other purpose; these knives are retained in position by a thumb screw.

The cam, D, in addition to moving the tool carriage, I, moves a guide pin in and out of the guide holes at the base of the stock table, F. The tools are all adjustable to suit light and heavy work, by a nut at the back of the tool carriage.

All the parts of the machine are made so that they can be reduplicated, in case of any accident or breakage. The countershafts are of tempered cast steel, and the boxes are all chambered and Babbitted.

It is claimed that an ordinary workman can make from 250 to 300 cabinet drawers per day with this machine, with an expenditure of only fifteen minutes per day in keeping the tools in order.

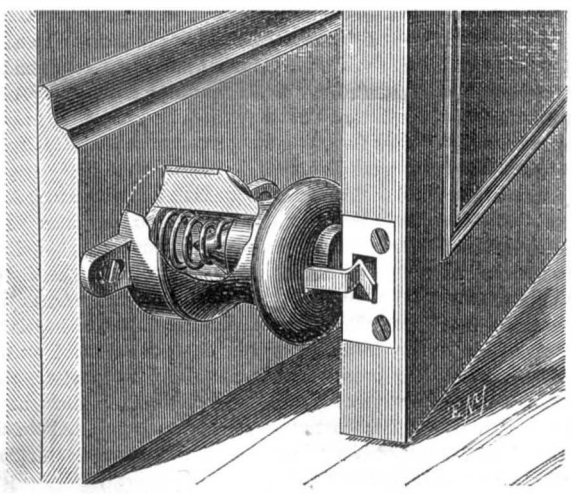
The machine has, we are informed, been introduced into some of the largest and best furniture manufactories in the country, and is giving the best satisfaction, as attested by many certificates shown us. Parties desiring to witness its operation can do so by calling at the furniture factory of J. T. Allen & Co., 48 Elizabeth street, New York. Further information may be obtained by addressing the Knapp Dovetailing Machine Company, Northampton, Mass.



KNAPP'S DOVETAILING MACHINE.

IMPROVED DOOR STOP.

The device herewith illustrated is not open to an objection made to some other elastic door stops, viz., that, when the door strikes the stop, it is thrown back again. In this stop the door is not only stopped without shock, but is caught and held from rebounding.



Its construction will be readily understood on reference to the engraving.

A hollow pillar of wood, or other suitable material, is attached to a metallic foot-plate, screwed to the base board, in such a position that, when the door is swung open, a catch plate, let into the edge of the door, near the bottom, engages with a spring catch which projects from the hollow pillar.

In the hollow of the pillar is a cushion of wood or other suitable material, which rests upon a spiral spring, as shown, a portion of the pillar being broken away to show the arrangement of the interior. This cushion receives the shock, while the catch holds the door from recoiling.

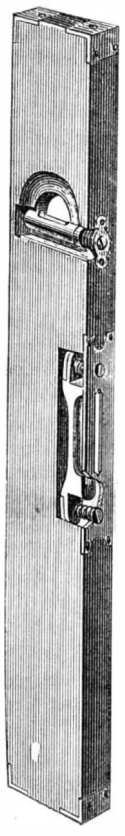
Patented May 31 and December 13, 1870. Address, for further information, Fahrney & Donaldson, Rockford, Ill.

Proposed Revision of the English Patent Laws.

It appears, at last, that there is hope that the English patent laws are about to undergo wholesome revision. Mr. Hinde Palmer, Queen's counsel, who is reported to be a friend of the working man, has taken the business in hand, and proposes to bring in a new bill, based upon sounder principles. It is expected that Mr. Macfie and Mr. Samuelson, who go for the get-all-for-nothing principle, will do all they can to defeat Mr. Palmer's reforms. The patent system in England ought to be amended, so as to recognize the primary right of the inventor to take the patent, and thus put a stop to the legal stealing of other men's ideas.

JOHNSON'S IMPROVED ADJUSTING PLUMB AND LEVEL.

The quick and accurate adjustment of a plumb and level is something which will appeal to the common sense of every mechanic as a great convenience. The level shown in the engraving has attached to it a provision for leveling which is both extremely simple and accurate.



The spirit glass in the level is set in an iron case, which is connected to the top plate by means of the screws, which pass through a flange at each end into a brass nut below. A spiral spring surrounds each screw, and the adjustment or inclination of the level is secured by contracting or expanding either one by means of the screw.

The level can also be adjusted by means of the long spiral springs, so as to work at an incline of a considerable angle.

The plumb tube is connected with a pivoted arrangement, which enables it to be adjusted by means of a center screw in the face plate, on the edge of the level. Therefore, to adjust plumb, it is necessary to simply turn the center screw to the right or the left, as the case requires.

The action of the center screw on the plumb tube operates to move it radially about the pivot, a very slight movement of the screw being sufficient to perform the adjustment.

The length of the springs enables the user of the instrument to set his own glasses easily and perfectly, while the liability to breakage is decreased.

A point of superiority claimed for this improvement, besides those already mentioned, is, that the iron case slides on screws which are threaded in brass nuts below. This enables the box to move through greater space, and does not strain the thread of either screw or nut; while brass will hold a stronger thread than gray cast iron.

This tool is more especially designed for machinists and other mechanics requiring great accuracy in levels and plumbs. In the old way of setting the glasses in plaster, no matter how perfect the level may be at first, there is a liability to some change by shrinkage in the wood, which impairs the extreme delicacy of the instrument, so that while it is perhaps sufficiently accurate for ordinary kinds of work, it will not do for the leveling of very nice machinery, etc.

Patented Jan. 20, 1868. For further particulars address William Johnson, Hedenberg Works, Newark, N. J.

How to Keep a Situation.

The following bit of good advice is from the *Working Man*, and is worthy the attention of all our readers:—

Lay it down as a foundation rule, that you will be "faithful in that which is least." Pick up the loose nails, bits of twine, clean wrapping paper, and put them in their places. Be ready to throw in an odd half hour or hour's time, when it will be an accommodation, and don't seem to make a merit of it. Do it heartily. Though not a word be said, be sure your employer will make a note it. Make yourself indispensable to him, and he will lose many of the opposite kind before he will part with you.

Those young men who watch the time to see the very second their working hour is up—who leave, no matter what state the work may be in, at precisely the instant—who calculate the extra amount they can slight their work, and yet not get reproved—who are lavish of their employer's goods, will always be the first to receive notice that times are dull, and their services are no longer required.

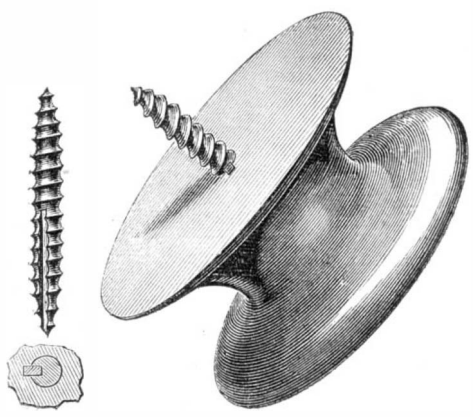
Method of Tinning Copper, Brass, and Iron in the Cold and without Apparatus.

F. Stolba contributes to Dingler's *Polytechnic Journal* the following method, of performing the above processes, which we find condensed in the *American Chemist:* The requisites for accomplishing this object are: 1st. The object to be coated with tin must be entirely free from oxide. It must be carefully cleaned, and care be taken that no grease spots are left; it makes no difference whether the object be cleaned mechanically or chemically. 2d. Zinc powder; the best is that prepared artificially by melting zinc and pouring it into an iron mortar. It can be easily pulverized immediately after solidification; it should be about as fine as writing sand. 3d. A solution of protochloride of tin, containing 5 to 10 per cent, to which as much pulverized cream of tartar must be added as will go on the point of a knife. The object to be tinned is moistened with the tin solution, after which it is rubbed hard with the zinc powder. The tinning appears at once. The tin salt is decomposed by the zinc, metallic tin being deposited. When the object tinned is polished brass or copper, it appears as beautiful as if silvered, and retains its luster for a long time. The author uses this method in his laboratory to preserve his iron, steel, and copper apparatus from rust. This method would become of great importance if the tinning could be made as thick as in the dry way, but this has not as yet been accomplished.

IMPROVED METHOD OF ATTACHING KNOBS TO SCREWS.

Mineral knobs are usually made with screws inserted while the material, of which the knobs are made, is in a plastic state. Wooden knobs, are, however, usually attached to drawers or doors by passing a screw through the drawer or door from the inside into the knob, which is awkward; or by passing the screw through the knob from the outside, which is unsightly. It is obvious that wooden knobs, provided with fixed screws like porcelain knobs, would be much more convenient in use.

This is accomplished in the simple and useful invention illustrated herewith. The screw is made with a gimlet point



at each end, and has a key seat cut in it from the middle to the end which enters the knob. The end having the key seat is then inserted in the knob; and a brad, being driven down into the wood so that it partially enters the wood and fills the key seat, effectually holds the screw, so that it may be screwed into a drawer in the same way as porcelain knobs are now inserted.

The manufacture of the improvement, except the driving of the brads, may be done entirely by machinery, and the inventor has, by this means, undoubtedly opened the way to a much more extended use of wooden knobs than has hitherto been the case. Patented May 5th, 1868. Address, for further information, C. H. Thurston, Marlboro', N. H.

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WE are gratified to announce that General M. D. Leggett, the new Commissioner of Patents, has entered upon the discharge of his duties. We have found the Commissioner a very affable gentleman, and are assured by him that he will use his utmost endeavor to bring up the business of the office; and he hopes that he may be able to have cases examined within two or three weeks after they are filed. Gen. Leggett has our best wishes for his future success, and, unless we mistake his character, he will avoid falling into the hands of the lobby clique, who usually attempt to worm themselves into the confidence of every new Commissioner, as soon as he gets into his seat. It has been recently charged, in the press of this city, that favoritism ruled in certain departments of the office. This inference was unjust to ex-Commissioner Fisher, and we believe that the officers, as a body, are high-toned, honorable men; but the Bible maxim, which urges us to avoid the very appearance of evil, is a safe one to practice.

PRACTICAL INSTRUCTION IN MECHANICS AND PHYSICS.

Baron Liebig solved the problem of practical instruction in chemistry, by founding a working laboratory in Giessen, more than thirty years ago. Previous to that time, there were no schools of chemistry on the continent, and it was only in the laboratories of private teachers that students were able to acquire a practical knowledge of the science. He met with great opposition at first, and it was only by dint of great perseverance and indomitable will, that he was successful. The professors in the other departments of the University objected to the appropriation of so much money to a science which, at that time, was hardly recognized as of the first rank. They were not permitted to have assistants and servants, and a large building for their special use, and they could not see why a chemist should be more highly favored. The young professor was not to be put down, and was finally able to secure the requisite funds for the erection of the famous Giessen laboratory. The school, thus founded by Liebig, soon become renowned in all countries, and students flocked to it from every nation. The inhabitants of Giessen, in recognition of the services thus rendered to the cause of education, and as a tangible proof of their regard, presented to Liebig a handsome residence in the city; and the Duke of Hesse ennobled him with the rank of Baron.

The foundation of this school was to chemistry what the establishment of the dissecting room was to anatomy. It is now difficult to conceive of there ever having been a time when chemistry was actually studied without apparatus or experiments; but such is the fact, and it is not necessary to go very far back to find that benighted period. The illustrious example set by Liebig has been followed in all countries, and everywhere laboratories for chemistry have sprung up, and an army of men have been at work making the discoveries which have been of such importance to mankind.

But how does the case stand with reference to physics? Where are the laboratories for practical instruction in this most important branch of knowledge? Where can the student go for practical instruction in the laws of light, magnetism, heat, sound, electricity, and mechanics? It is true that some of the practice in light he can learn from the photographer; and magnetism may be practically unfolded in the office of the telegraph company. The laws of heat are so poorly understood that most of this force is wasted in attempts to apply it; and sound gives a very faint report for itself in the curriculum of the student. The truth is, we need a Liebig in physics, some one who will found a school where heat, light, electricity, and sound, can be studied, just as the chemist acquires a knowledge of the properties of matter by handling it in his laboratory. Some of our most illustrious physicists have shrunk from making the attempt, as they have been too much absorbed in their own researches, and have not felt that they could spare the time. Perhaps it is well that Arago, Oersted, Faraday, and Ohm, were not interrupted in their studies and discoveries by the necessity of giving instruction to a class of students; and yet it may be queried if they could not have accomplished more by the aid of skillful assistants, just as Liebig, Woehler, and Bunsen, have done in chemistry. However this may be, it is with great satisfaction that we observe a movement in England and this country, to establish schools for practical instruction in physics. At Manchester, in England, Professor Stewart is to have a completely appointed laboratory, where the classes can acquire practical knowledge of the use of instruments, where they can perform all the common experiments in physics, and learn how to make original investigations. In fact, the same principles that have been found to apply so well in chemistry, will here be tried and modified as experience may dictate to be necessary.

The same thing is to be done in London. Already at King's College, two large rooms, adjoining the Museum of Physical Apparatus, are fitted up for a physical laboratory; and a third room has been built for the battery and supplies. "Fixed tables in both large rooms are supplied with water and gas, and with pipes passing to gasholders containing oxygen and hydrogen; also with thick copper wires, insulated with one another, passing to the battery room, so that, in electrical work, the fumes from batteries are entirely got rid of.

"The principal instruments have their fixed places on the tables, and a description of the measurement to be made is given to each student; and, while in progress, his work is examined by the professor or demonstrator. The course of study includes the subjects of pneumatics, heat, light, electricity, and magnetism; and with the regular class a definite order, in each subject, is kept to, as nearly as possible. When, as has sometimes been the case, there are twelve or more students beginning their laboratory course at the same time, it is necessary to deviate from the regular routine, and to set some to begin with heat, some with light, and others with electricity. For some experiments, such as the determination of the relation between the pressure and volume of a gas, or the measurement of the expansion of a gas for given changes of temperature, requiring the use of the manometer and cathetometer, it is found better to have two students working together, each student making in his turn, and so checking every part of, the measurement or determination."

A somewhat similar plan to the above has been adopted by Professor Pickering, of the Institute of Technology, Boston; and the results everywhere are pronouced to be of the most encouraging character. We see no reason why a school of physics may not be established in every institution where there is adequate room and sufficient capital to bear the expense. Without handling the instruments, students obtain very indefinite notions of the subjects; and as it would now be regarded as absurd to teach anatomy without dissection, or chemistry without a laboratory, so it ought to be pronounced as equally irrational to study physics without practical demonstration.

INSPECTION OF STEAM BOILERS IN OHIO.

We have been favored with a copy of an excellent bill introduced in the Legislature of the State of Ohio, by the Hon. T. J. Haldeman. The bill requires the Governor to appoint a theoretical and practical engineer as a supervising inspector, to hold his office for three years unless removed for cause.

The supervising inspector is to appoint a local inspector for each Congressional district in the State, and the local inspector, so appointed, is to be a thoroughly competent theoretical and practical engineer, removable by the supervisory inspector for incompetency or other sufficient cause. The local inspectors are to be furnished with blank certificates of inspection, and with necessary apparatus (at the expense of the State) by the supervising inspector, who is required to keep a record of all inspections of steam boilers as reported to him by the local inspectors.

Within thirty days after the passage of the act, any person, owning or controlling a boiler in use in the State, is required to give notice of the location thereof to the local inspector of the district, and the inspector, as soon as practicable, must proceed to inspect and test the same. He shall prescribe a limit of steam pressure, and shall give a certificate of such inspection and limit of pressure to the owner of the boiler. The limit desired by the owner shall be the one certified, if safe, and the hydrostatic test is not to be—unless consented to by the owners—more than one fourth greater than the working pressure allowed.

The local inspector must satisfy himself that the boiler is of good material and substantially constructed, and of proper proportions in all its parts. He is also to see that the safety valve is well arranged, in good working order, and of the dimensions prescribed by the act, which also prescribes minutely the location and arrangement of gage cocks, and the attachment of steam and water gages. But the owner is allowed, if he prefers it, to attach, instead of the water gage, a low-water indicator.

The inspectors may pass safety valves on boilers now in use, if satisfied that such valves are of sufficient size; but upon all boilers hereafter constructed, the diameters of the safety valve must be not less than two inches for one boiler; three inches for a battery of two boilers; three and a half inches for a battery of three boilers; for a battery of four boilers, a valve, on each outside boiler, of not less than three inches; for a battery of five boilers, a valve, on each outside boiler, of not less than four and a half inches; and on a battery of six or more boilers, a valve, on each outside boiler, of not less than five inches, and no spring-loaded piston or balance valve is allowed except on locomotive boilers.

This rating of the size of safety valves, in proportion to the number of boilers instead of their capacity for steam production, is defective. Mr. Haldeman should reconsider this feature of the bill.

One hundred and ten pounds to the square inch is fixed as the maximum pressure allowed as a working power for a new boiler forty-two inches in diameter, and of the proper construction and material, and with plates at least one fourth of an inch thick; and the working power of all high-pressure boilers is to be rated according to their strength, compared with this standard. In high-pressure flue boilers, flues of sixteen inches diameter are to have a thickness of no less than a quarter of an inch, and in that proportion of strength for flues of a greater or less diameter. If, on inspection, the local inspector approve the boiler, he is required to make a complete record of the test and inspection, with a minute and particular description of the boiler, and of the dimensions, proportions, and conditions of every important part and appliance thereof, and to certify that the boiler and its appliances are safe, a copy of which record and a certificate is to be given the owner or controller of the boiler.

The bill also provides for the inspection of, and granting to, persons placed in charge of boilers, certificates of qualification, and imposes a penalty of ten dollars for each day they attend a boiler without such certificate.

It requires manufacturers of boiler iron to stamp their plates, at two diagonal corners and in the center of the plate with the letter C for charcoal iron not hammered before rolling; P for puddled iron, and C H for charcoal iron hammered before rolling, together with the name of the manufacturer, and numbers indicating the quality of the iron And it also imposes a penalty upon manufacturers of boilers who shall use iron not so stamped, for boiler making. If steel plates are used they must be marked steel, and possess a tensile strength equal to that of charcoal hammered plates.

These are the general features of the proposed law; but there are many details omitted in our summary. In short, the bill is extremely minute in its requirements, but we think not too much so to be effective. It will repay a careful reading by those who are interested in perfecting systems of boiler inspection.

PROGRESS OF THE DARIEN SHIP CANAL.

A year ago we illustrated the route, for a canal across the Isthmus of Darien, which the experience of many explorers up to that time had indicated as the one preferable to all others. As the readers of our paper are aware, the final result of Com. Selfridge's exploration of the San Blas route was against its adoption. Now the same officer is examining carefully the proposed line of the Atrato river, and at the same time Com. Shufeldt is making a survey of the route across the Tehuantepec Peninsula. The route alongside the Panama Railroad seems to have been passed by, because of the poor harbors on both sides.

The Tehuantepec route, with all its disadvantages, has many earnest advocates; yet it would hardly seem probable that a canal which even its best friends admit must have at least 25 locks, can be adopted as the great highway of nations. There is, too, a doubt as to the supply of water for lockage, which the present survey will either confirm or dispel.

The route *viâ* the Atrato River has been many times reconnoitred, but never in the exact locality where Com. Selfridge is running his line. Trautwine went up to its very source, and passed over the "divide" in a distance of a few hundred yards, and at no great elevation; but that route was utterly impracticable. He again struck an air line from the mouth of the Napipi to Kelly's Bay, a fine harbor on the Pacific, and he estimated the cost of the canal at $225,000,000. This route was still later surveyed by a Government corps with the same result.

The route now taken by Com. Selfridge is one indicated by Trautwine, as probably affording a better route than those directly surveyed by him. It enters one of the northern mouths of the Atrato, goes into the main stream, then up the Cascarica river, which flows from the northwest into the Atrato. Leaving this, it strikes the waters of the Tuyara on the Pacific side, passing over an elevation of not more than 300 feet. The Tuyara is navigable for large vessels for 40 miles from the Pacific ocean, while on the Atlantic side, good river navigation extends up from the Gulf of Darien for 45 miles. Between these points is about 30 miles, the greater part of which will be deepening of the Tuyara river. The Gulf of San Miguel on the Pacific, and that of Darien on the Atlantic, are excellent harbors, land-locked, and having great depth of water. The Gulf of San Miguel is the same terminus as indicated for the route from Caledonia Bay, which we illustrated last year. This is a *resumé* of the latest information from the Darien Expedition. Accurate surveys may alter these conclusions, and it may yet be determined to use the Panama route, even with expensive docks, or making an artificial harbor, as at Port Said.

THE material interests of Bellaire, Ohio, are greatly prospering, in consequence of the union of capital, in the nail mills, factories, glass houses, and agricultural works, which are not afflicted with strikes. Nearly all the operatives are personally interested in the welfare of the concern they work for; hence their whole aim is to render it successful.

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SCIENTIFIC EDUCATION AND RELIGION.

The race of Don Quixotes is not yet extinct, and Sancho Panzas are still to be found, to follow the lead of such doughty knights; the modern champion fights, however, with the pen instead of the lance, and aims his blows against the realities of science, instead of against the figments of a distempered imagination. Last year our attention was called to a remarkable instance of such Quixotic undertakings, remarkable, however, only in its utter absurdity. "Creation a Recent Work of God" is utterly beyond the pale of scientific criticism. It is written to give to the world a new scientific (!) version of creation, and is an endeavor to make geological facts accord with a *literal* interpretation of the Mosaic record, in opposition to what has been deliberately affirmed by the highest experts in science, as well as by thoughtful and qualified theologians. The author believes that the entire geological history can be compressed within the limits 6,000 years, and that man lived amongst palæozoic trilobites! And this wonderfully original theory, worthy of the days of Burnet and Whiston, is supported by equally original data and arguments. What will Sterry Hunt say to this passage: "The Psalmist says God founded the earth on its 'bases,' and modern science teaches that the bulk of the materials of the earth consists of three great acid, alkaline, and neutral bases"? Or Agassiz, to this statement: "In his [man's] first embryonic stage, he resembles a fish; in his second, a reptile; in the third, a bird; in the fourth, a mammal, and lastly, he is a man," etc.? The following, we suspect, must have been plagiarized from the showman of the Cardiff giant: "Scientists say that human flesh will not become fossil, but living witnesses say, a dozen bodies have been found in that state in America within the last twenty five years." "In California a pig, toads, and lizards have also been found petrified;" whilst this is far too good to have been plagiarized from anybody: "The richest deposit of mammals has been found in the secondary series of stratified rocks, and the tracks of quadrupeds, birds and men have been discovered in the old red sandstone, which is the beginning of that series"—a most successful sentence, as it could not possibly have been worded to convey more error! As the enitre book is written in the same strain, the reader may well ask why we draw attention to such a farrago of nonsense. We do so, because it is written professedly in the interests of religion, by the rector of an Episcopal church in this city, who should, therefore, we presume, be a clergyman of some educational standing; and because it is not a solitary example, though perhaps it is the worst we could quote, of such burlesques of a serious subject.

We have been credibly informed that this book, foolish as it is, has been favorably reviewed by more than one religious paper; and, since our attention was drawn to it, we have seen a brief notice, in the daily papers, of a lecture by another clergyman, which seemed to have been similarly directed against the teachings of geology. From this, we infer that these clerical Quixotes and their lay supporters must be more numerous than we had supposed, and we therefore think it time to say a few words, not against the knights themselves, but in regard to the system of education and moral culture which permits—shall we say, promotes?—the production of such out-of-date champions of mediæval ignorance.

The knight of La Mancha's first bane was his library. Now, a library is not a bad thing in itself; but, by itself, it may be worse than useless as an intellectual possession; and the Don lived in his, and forgot for a time the world outside; he became a believer in written authorities, whose statements he had no means of verifying; he passed his existence amidst a waste of words, and lost the use of his own perceptions; and thus, when he wandered into the realities of life, animated, as he was, by all the follies of the past, and utterly ignoring or misconceiving the facts of the present, he is wisely represented by the satirist as an egregious madman. Had Cervantes been a recent writer, we might have read in his satire a caricature of the victims of our conventional system of education, substituting for the tales, and the phraseology, and principles of knight-errantry, the study of dead languages, the myths and unapplied lessons of history, and the philosophy of the dark ages. A knowledge of languages, ancient and modern, and of history, and of mathematics, are certainly essential elements of a liberal education; but, by themselves, not supplemented by other studies and training, they leave their possessor utterly unqualified to meet the requirements of the age in which he lives, and to discuss intelligently the vital questions, social, political, and religious, that at present agitate society. But such absolute ignorance is necessarily passive, and it is only when a man thus uneducated, relying upon a knowledge of terms not realized and formulas not comprehended, and without any practical experience in scientific methods of experiment, research, and reasoning, ventures into scientific discussion, that we find how far he is behind the age. He then becomes actively ignorant, and will assuredly injure any cause that he endeavors to support; and of such active ignorance, the author we have cited is an unusually forcible illustration. He has evidently never mastered the first elements of the sciences which he so boldly calls to his aid; and he ignores every principle of inductive philosophy.

Unfortunately, if we take the trouble to test the majority of our so-called well educated men, we shall find in them, unless their education has been leavened by some sound scientific instruction, more or less of these same deficiencies; the same in kind, but, thanks to common sense, less in degree, decreased, probably, by the lessons of practical life. However few the number of such men who feel called upon to display their ignorance in print or in the lecture, it is the want of higher knowledge in the mass that encourages these exhibitions, which, without impeding the advance of the science they attack, bring ridicule upon the religious doctrines they are supposed to be defending. It seems to us imperative upon those who are interested in religious progress, to have scientific instruction of a broad and liberal character introduced into all school and college education. Its omission from a general education is worse than a blunder. Science is merely the interpreter of the works and the will of the Creator, as recorded by Himself, and no religious mind need fear evil from its progress, nor from the dissemination of the truths it teaches. On the contrary, a fear of possible results of scientific inquiry and, worse still, misstatements, or wilful ignorance and unsound arguments based upon it, are derogatory to the wisdom of the Creator, and are, if used by its advocates, the surest means of injuring the cause of religion. We trust, however, that such travesties of scientific subjects as those here alluded to will yet serve a good purpose; we believe that they will bring such ignorance of science and of truth as they display into discredit, and thus indirectly promote the development of a system of sound and enlightened education.

CAISSON FOR THE NEW YORK END OF THE EAST RIVER BRIDGE.

It is thought that this structure, which is now rapidly approaching completion, will be ready to launch about the middle of May. At a recent visit, however, we found that there were yet many courses of timber to lay, and we hardly think the launch will take place quite as early as anticipated, though there will probably not be much delay.

It is thought that, although this caisson will be sunk much deeper than the first one—that is, to eighty feet below high-water mark, to the bed-rock—it will take no longer to sink it, on account of the greater ease of excavation in the sandy soil on the New York side. The structure is, however, altered somewhat from the one on the Brooklyn side, to fit it for the greater depth to which it will be sunk, and also in the adoption of improvements suggested by experience gained in the sinking of the Brooklyn caisson. The construction is proceeding at the yard of W. H. Webb, at the foot of Sixth street, on the East river; the contractors for the timber work being the same who built the Brooklyn caisson, Messrs. Webb & Bell. The iron work is supplied by Messrs. Roach & Son, of the Morgan iron works.

The dimensions of the caisson are 102 by 172 feet at the base, the interior chamber being nine feet in hight. The side walls of this chamber are inclined at a sharp angle toward the center, and the interior is entirely lined with boiler iron. This will obviate the danger of obstruction of the work by fire, which occurred in putting down the first caisson. When completed, the top will be about fifteen feet in thickness of solid timber, and nearly 400,000 cubic feet will be used in the entire structure. The timber is Georgia pine, bolted together by almost numberless drift-bolts and screw-bolts of iron, and the structure already presents a most massive and imposing appearance.

The interior chamber is subdivided into six chambers, the walls of which are to be four feet thick when completed. The chambers communicate with each other by suitable doors.

The air locks are constructed to give greater convenience in ascending and descending than those on the Brooklyn caisson. There are, to each of them, two separate entrances from the principal tube into the caisson, either or both of which may be used, as occasion requires. No important change will be made in the arrangements of water shafts and pipes for the sand pumps.

The lining of boiler iron subserves two important ends, namely: the prevention of fire, which, under the great pressure to which the air in the caisson must be subjected, would otherwise be difficult, and the obviation of the necessity for thoroughly caulking every part of the timber work, to prevent leakage.

This is probably the largest caisson ever constructed, and the event of its launching and towing down to its future position will be anticipated with much interest.

THE MORAL LUBRICATOR.

The great moral lubricator which makes everything in human life run without friction, is good temper. As soon as this is exhausted, the journals of the human machine begin to heat, and wear, and screech, and the entire mechanism becomes noisy and ruinously wasteful of power.

"The horse that frets, is the horse that sweats," is an old saying of horsemen, and it is just as true of men as of horses. The man that allows himself to get irritated at every little thing that goes amiss in his business, or in the ordinary affairs of life, is a man that, as a rule, will accomplish little, and wear out early. He is a man for whom bile and dyspepsia have a particular fondness, and for whom children have a particular aversion. He is a man with a perpetual thorn, in his flesh, which pricks and wounds at the slightest movement; a man for whom life has little pleasure, and the future small hope.

To "keep jolly" under all provocations is perhaps a task which only Dickens' Mark Tapley could perform. We never have met Mark Tapley in our experience of human nature, but we have seen him closely approximated; and it would be well if people in general could approach more nearly that inimitable character.

In all the phases, emergencies, and occupations of human life, good temper is a commodity for which there is great demand; but in those which bring an individual into daily contact with many others, it is perhaps in greatest demand and most limited supply.

We have often suffered in our personal feelings, from the incivility of telegraph operators, railroad conductors, ticket agents, etc. No doubt these officials have much to try their patience, and are called upon to answer many foolish questions. We are certain, however, that we never asked one of them a foolish question, and we are just as certain that it is very rare to get a reply from such people, that is not in word, or in manner, uncivil. Perhaps it is not meant to be uncivil, but it is given in an impatient petulant way, very grating to the sensibilities of refined people.

Were these men good-natured, they could not help being civil. Civility is as natural to a good-natured man as breathing. Even if rude and unpolished in manner, inborn goodness of heart makes itself pleasantly felt in all the relations of life; while the most polished manners and refined language may cut deep, and leave lasting wounds.

To foremen in shops, and superintendents of large manufacturing establishments, good temper is a most valuable qualification. Indeed, this article was suggested by a notable want of good temper, in the treatment of subordinates, by a foreman in an establishment recently visited by us. It was evident that this establishment was pervaded by a spirit of revolt, begotten by the brow-beating insolent language and manner of the foreman. The men were sulky and obstinate, being undoubtedly rendered unmanageable and restless by the total disregard of amenity in the man placed over them. Surely, thought we, whatever skill in his profession this man might possess, it was dearly purchased at the expense of willing service on the part of the workmen.

When, from any cause, a man is forced to add, to his physical toil, the burden of a discontented mind, he will neither do as much nor as good work as when his heart is light, and his mind easy.

It requires more than technical knowledge and skill to make a good foreman. The power to manage and control men is an essential, which can never be found apart from good nature. Of course we do not mean that sort of "good nature" which results from want of firmness, but that broad, wholesome, breezy heartiness that feels good itself, and loves to have others feel good, and which shows itself as much in rebuke, as in praise.

WHISKEY, NEW AND OLD.

A correspondent asks: "Why is old whiskey more pleasant to drink than new—proof being the same? What chemical change takes place by age? and is it more injurious to drink new (same proof) than old?" We do not advise any body to drink whiskey, but we counsel those who have already acquired the bad habit, to confine their attentions to the old rather than to the new. There is always more or less glutinous or nitrogenous matter in liquors derived from starch, even after they have been subjected to distillation; and this undergoes slow oxidation in the course of time, and settles in the bottom of the cask. There is also frequently more or less fusel oil, which is also oxidised and rendered less poisonous in process of time. Hence old whiskey has a less disagreeable taste, and will not kill off quite so rapidly as the new article, which is freshly primed with the elements of destruction. When physicians prescribe whiskey as a medicine, they direct the patient to use the old article, as experience has proved its greater efficacy. It is only as a medicine, and in small quantities, that a liquor of this strength ought to be employed.

It contains so much alcohol that it abstracts water from the tissues, converting them into a species of parchment; and while it stimulates for a short time, the re-action leaves the system weaker and more exhausted than before.

DANGEROUS DENTISTRY.

An article with the above caption has been sent to us for criticism. It is well known that the best substance with which to give the peculiar flesh tint to india-rubber is vermilion; and as a considerable quantity of this compound must be used, it is natural for persons, who make the study of mercurial poisons a specialty, to raise the inquiry how far hard rubber in dental plates may be the source of disease. A question of this kind can only be determined by a careful record of cases, made by dispassionate physicians. We are not in a condition to decide it, but we would suggest the possibility of the opposition to hard rubber plates having its origin in the desire of interested parties to make a larger margin of profit from gold plates. Hard rubber plates are cheap, and it is for this reason that many poor persons can have a full set of false teeth, when, if the old price for gold plates were maintained, they would be compelled to do without these ornamental and useful appendages.

Vermilion is sometimes prepared by dissolving sulphur in caustic potash, and shaking the liquid well with metallic mercury—the red powder settling in the bottom. The sulphur is not considered dangerous, and it is very uncertain whether the mercury becomes separated from the sulphur in a way to produce injurious effects. The testimony of physicians would be valuable on this point, but sensational articles by interested persons, ought to have little weight.

NITRO GLYCERIN AGAIN.—On Sunday morning, March 12th, seven hundred pounds of nitro-glycerin exploded, in a small wooden building on the west side of the Hoosac tunnel. The building was of course blown to splinters. The cans, in which the glycerin was kept, were spread out in ragged shapes. A young growth of birch and maple was cut through for a distance of twenty rods, the path being six rods wide. The trees, three inches in diameter, were torn and twisted into withes. The village of North Adams, two and a half miles distant, was shaken as if by an earthquake. No lives were lost, but the explosion was terrific.

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OBITUARY NOTICES.

DEATH OF JOSEPH POOLE PIRSSON.

One after another, our cotemporaries are passing away. Last week we announced the death of Mr. Aaron R. Haight, for many years employed in our office, and now we have to chronicle another death, that of Joseph Poole Pirsson, who died at his residence in this city, on March 17th. Mr. Pirsson was the son of Joseph Poole Pirsson, a prominent member of the New York Bar, and distinguished as a chancery practitioner. The subject of the present obituary notice was, by profession, a civil engineer and solicitor of patents, possessing superior knowledge of practical and theoretical mechanics. As a solicitor of patents, he attained a large practice, and was skillful and comprehensive in the preparation of his cases. He published several useful works relating to his profession, the most prominent of which was entitled, "Laws and Practice of all Nations and Governments Relating to Patents and Inventions." The *Eureka*, a magazine devoted to Mechanism, Inventions, Patents, Science, and News, was also published by him and his partner, Mr. Kingsley, now deceased, who also assisted in the preparation of the above-mentioned treatise. The magazine was discontinued in 1850 or 1851. It was well conducted and well patronized, and was also one of the first of that kind of publications printed in the United States. Mr. Pirsson was also the author of a set of forms of patent practice, which were very generally used at home and abroad. He was also an inventor of considerable skill, and the originator of the "Pirsson Condenser" for supplying marine engines with fresh water, the first successful invention of the kind. It was not only placed in many of our first vessels of the mercantile marine, but in vessels of the United States Navy. Mr. Pirsson derived, for a time, a handsome revenue from this invention, but it was subsequently extensively pirated. He was well read in elementary chemistry, and an enthusiastic astronomer. He was also well read in ecclesiastical history, and the traditions of the Protestant Episcopal Church, of which he was a zealous and active member. He was an amiable and estimable citizen, and highly esteemed in the private relations of life. He was obliged, some years since, to withdraw, on account of ill health, from the large and lucrative practice he had secured, and though he rallied for a time upon the cessation of his labors, he never fully recovered his health. His remains were interred in Trinity Cemetery, the funeral being largely attended by the most distinguished citizens of New York.

DEATH OF PROFSSOR WETHERILL.

We regret to have to announce the death of Dr. Charles M. Wetherill, Professor of Chemistry at Lehigh University, Bethlehem, Pa., which took place on March 5, 1871. Professor Wetherill had acquired a national reputation by his researches and publications, more particularly in agricultural and organic chemistry. He was at one time connected with the chemical laboratory of the Agricultural Department in Washington, and at that time made an exhaustive investigation into the chemistry of American wines. He also published an important paper on the peculiar fat of dead bodies, called adipocere. His loss will be severely felt, not only by the institution with which he was connected, but by the country at large.

DEATH OF WALTER B. FORBUSH.

Mr. Forbush, who was killed at the recent New Hamburgh disaster, was a solicitor of patents at Buffalo, N. Y.

He was a son of E. B. Forbush, who was also killed, at the disaster at Angola, several years ago.

At the time of his death, Walter B. Forbush was about thirty years of age, had a good business, and was noted for his clear understanding of mechanical inventions, having been gifted by nature with a remarkable mechanical mind. He left a wife and three children, and we are pleased to learn that his life was insured for $25,000; consequently his family is left in comfortable circumstances.

SCIENTIFIC INTELLIGENCE.

REMEDY FOR FESTERING WOUNDS AND CANCERS.

Professor Böttger recommends gun cotton, saturated with a solution of permanganate of potash, put up in the form of a poultice, and held over an open wound by a bandage, as the best disinfectant for bad odors that can be conveniently applied. The strength of the solution of permanganate, best adapted for the purpose, is one part, by weight, of dry salt in one hundred parts of water.

Ordinary cotton cannot be taken, as it readily decomposes, but gun cotton is permanent, and not liable to explosion when in a moist state.

LIQUID FOR ELECTRIC BATTERIES.

According to Dr. Bradley, there is a wide difference in the composition of these liquids. We subjoin some of the most approved admixtures: One consists of 800 grammes water, 50 grammes bichromate of potash, 50 grammes sulphuric acid, and 2 grammes chromic acid.

McCracken liquid: 1 pound bichromate of potash, 1 gallon of water, 3 pounds sulphuric acid.

Poggendorff liquid: 3 pounds bichromate of potash, 4 pounds concentrated sulphuric acid, 8 pounds (1 gallon) water.

U. S. Telegraph Company's liquid: 5 gallons water, 6 pounds bichromate of potash, 1 gallon sulphuric acid.

Western Union Telegraph Company's liquid: 18 pounds water, 1 pound saturated solution of bichromate of potash, 1 pound sulphuric acid.

Newton's solution for destroying organic matter: 12 fluid ounces water, 1 fluid ounce sulphuric acid, 1 ounce bichromate of potash.

PRESERVATION OF WOOD UNDER WATER.

A correspondent inquires if there are other substances besides chloride of zinc that have been used for protecting timber under water. We find an elaborate paper, by Dr. Ott, in the *Journal of Applied Chemistry*, which may serve as an answer to the inquiry. A committee of *savants* was appointed, by the Dutch Academy of Sciences, to conduct experiments; and in their report, they classify the experiments into three groups: First, the coating or alteration of the surface; second, the impregnation with various preparations; and third, the use of timber different from that usually employed.

I.—THE COATING OR ALTERATION OF THE SURFACE.

In this group the following alleged remedies were tried:

1. A mixture of tallow, coal tar, resin, sulphur, and powdered glass, applied warm, upon the previously roughened wood, to the thickness of several millimeters.

2. Paraffin varnish, obtained by dry distillation of peat.

3. Coal tar, applied cold and warm upon the superficially charred wood. Into some piles, holes were bored, which were stopped up, after being filled with the hot tar, which then had a chance to penetrate into the interior. Others were coated with a mixture of coal tar and oil of vitriol, to which some sal ammoniac and olive oil had been added.

4. The piles were coated with a paint consisting of linseed oil, turpentine, chrome green, and verdigris.

5. The surface was carbonized.

The thus prepared piles were immersed in May, 1859; on being examined in September of the same year, it was found that, with the exception of the wood mentioned in No. 3, which only presented traces of the teredo, none of the preparations had furnished protection. In the fall of 1860, or after one year and a half, the wood treated with coal tar was also thoroughly infested by the worm. From the results of these experiments, it seems therefore to be fully established that, although external coating may for some time prevent the attaching of the larvæ and young worms, the least abrasion, such as may be caused by floating ice or other means, or the cracking of the wood, will allow the entrance of the teredo to an injurious extent.

II.—THE IMPREGNATION WITH PREPARATIONS.

Under this head trials were made with:

1. Sulphate of copper,
2. Sulphate of iron.
3. Acetate of lead, which proved ineffective.

4. The wood was first impregnated with soluble glass and then with chloride of calcium, in order to form a silicate of lime in the interior. Before being immersed, it was exposed to the air for half a year, so that the chemical combination might be complete. In March, 1862, the wood was sunk into the sea, and in October of the same year was found to be thoroughly invested.

5. Oil of creosote.—This is a well-known product of the dry distillation of coal, which, in being subjected to a second distillation, is freed from the very volatile as well as from the semi-solid portions. In May, 1859, creosoted piles were immersed in different harbors, and when examined in the following September, no indications of the worm could be discovered, while non-creosoted piles were thoroughly infested. Another trial was made in July, 1830, with ten piles of oak and pine, saturated in the same manner; later on, piles of beech and poplar were immersed, which had been treated by Boulton, in England. On examining these piles in the falls of 1862, 1863, and 1864, they were all found to be perfectly sound, with the exception of the piles of oak; while the non-prepared woods were more or less affected by the worms. In sawing through one of the oaken piles, it was ascertained that it had only been partly saturated. However, the iles of pine, beech, and poplar, treated in the establishment of Boulton, presented in 1864—or after three years' exposure—not the least indication of the teredo, and, after detaching the outer portions, they resisted equally well. The same result was obtained with piles, saturated by a firm in Amsterdam, that had been exposed for five years.

Of the non-impregnated piles, nothing had been left but the small head pieces projecting beyond the surface of the water. The rest had become a spongy mass, yielding to the least pressure. Petroleum had been recommended to the committee, but, owing to its high price, no experiments were undertaken with it.

III.—USE OF EXOTIC TIMBER.

With regard to exotic woods, the experience of the committee is but moderate. It can only be stated, with certainty, that some kinds of wood from Surinam, the American oak and several others, were not spared. Besides, the committee was presented with a perforated piece of heavy guajac wood, which had been laying in the sea, near Curaçoa, a proof that even the densest wood is not impregnable. Finally, the committee had received information about various woods, reputed to be poisonous, and by which the fishes are said to become stupefied, and die, but no opportunity was afforded to experiment with them We are assured, however, that the Dutch Government is making investigations in regard to this matter in the East and West Indies.

The report of the committee may be summed up as follows:

1. That mere external coating with paint or other substances furnishes no protection, since it is impossible to maintain an unbroken surface; the young teredo will enter the slightest crack or abrasion. The lining with iron, copper, or zinc plates, or the driving full of broad-headed nails is not only expensive, but protects the timber only as long as the lining remains perfect; and since this is impossible, it is of no use.

2. Impregnating timber with soluble inorganic salts, which are poisonous to animal life, constitutes no protection, owing, firstly, to the fact that the teredo does not nourish itself from the ligneous tissue, but simply perforates it in order to secure a lodgment; and, secondly, to the circumstances that the water washes out the salt.

3. The density of the wood, as far as known, is of no avail.

4. The only true protection against the worm is found to be creosote oil, to which attention ought to be directed, as well as to the kinds of wood most absorbent of it; and to the most effective methods of impregnating it with this material.

The experiments were conducted in salt water, chiefly in reference to the teredo or ship worm, but they apply equally well for fresh water. In Germany, extensive use is made of chloride of zinc, by placing timber in boilers, partly exhausting the air, and driving the vapor of chloride of zinc into it. The amount to be taken can only be determined by experiment. Metallic zinc has also been used in a similar way.

ENDLESS PLATFORM BELT RAILWAY FOR NEW YORK.

There has been no end of schemes, mostly absurd, for steam conveyance to accommodate the local travel of New York. We leave it to the reader to decide in what category a plan proposed by Mr. Robert Taylor, of 527 West Twenty-second street, New York, should be placed. The plan proposes that a series of endless rule-jointed aprons, running side by side, should be kept in motion by steam power, and extend entirely about the city, elevated, of course, and skirting the coast of the island. The outside one is proposed to be moved at three miles per hour, and each one in the succession inward is to move three miles per hour faster; so that three being employed, the inner one will run at nine miles per hour, the maximum speed. Mr. Taylor thinks it will be easy for people to step upon the outside apron, and from that to the next, and so on to the last, where they can be seated until they reach their destination. We hardly deem the subject worthy of serious discussion, but it is interesting, as being one of the many curious ideas, evolved by the pressing needs of the city for better traveling facilities.

TELEGRAPHIC COMMUNICATION WITH THE EASTERN WORLD.—The attention of the New York Chamber of Commerce has been called to the pressing necessity of establishing a submarine cable under the Pacific ocean, and placing this continent in electric communication with Japan, China, and the Sandwich Islands. There is enough telegraphic traffic to pay good dividends on the outlay. Even at present rates, *vid* Europe, namely, about $50 gold for twenty words, the number of messages forwarded is considerable; and, besides the inducement of low rates, the new cable would be a great benefit in saving of time.

THE DAVIS' SEWING MACHINE, manufactured at Watertown, N. Y., has been before the public some ten years, and is probably familiar to many of our readers. The Company, having recently greatly increased its facilities for supplying this machine, now calls for agents throughout the United States and Canada, as will be seen by its advertisement in this paper.

WHITE SPONGE.—Sponge can be bleached by soaking it in a weak dilution of hydrochloric acid, which removes the calcareous matter, and then washing it several times in cold water; after which it must be soaked in water holding a little sulphurous acid, or chlorine in solution.

A MAN in England has recently patented a hand garden-seed sower, which, he claims, will always drop just the desired number of seeds, and thus save the after-expense and trouble of thinning out.

Queries.

[We present herewith a series of inquiries embracing a variety of topics of greater or less general interest. The questions are simple, it is true, but we prefer to elicit practical answers from our readers, and hope to be able to make this column of inquiries and answers a popular and useful feature of the paper.]

1.—SHELLAC POLISHING.—How shall I prepare and use shellac, for polishing on a wheel?—J. L.

2.—SOLDERING CAST IRON.—In my query No. 5, in issue of March 4th, please substitute chloride of zinc for chloride of lime.—W. L. B.

3.—YELLOW RAIN.—We had a rain storm, at New Orleans, on the night of March 8th, leaving on the pavement a deposit of something resembling sulphur in color, but not having the fumes of sulphur when heated. I understand it has occurred frequently in different places, but find no one who has ever seen it before. I would like an explanation from some of your correspondents.—W. H. B.

4.—STOVE POLISH.—Will some of your numerous readers please give me a good preparation for polishing stoves—something that does not require so much rubbing as the usual compounds do?—W. J. N.

5.—GRINDING OCHER, ETC.—I wish to learn how to reduce a substance like chalk or ocher to a very fine powder. Is there any process better than grinding through mill stones? Is there any process of separating the same better than a bolt such as is used in flour mills? A No. 12 bolt is not fine enough. What is the advantage of running the under mill stone, and how large diameter can such a stone be run to advantage?—C. E. H.

6.—WIRE SPRINGS.—How can iron wire be tempered, so as to make good elastic springs?

7.—DISTILLING ESSENTIAL OILS.—Can the oil be distilled from wintergreen or peppermint, by connecting a steam pipe from a boiler to the still, just as well as by setting the still in a furnace?—A. V. S.

8.—FROSTING SILVER.—How can polished silver be given a frosted appearance?—D. E. K.

9.—CLARIFYING OLIVE OIL.—I have some olive oil that has become discolored by standing. How can I render it white and marketable again?—R. A.

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Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at 1·00 a line, under the head of "Business and Personal."

All reference to back numbers must be by volume and page.

BURSTING OF FURNACE.—In answer to your correspondent's query, I will say that I have witnessed about a dozen explosions of furnaces within the last six months. In all these cases the roof was blown off; and, in a few of them, workmen were seriously burnt. I believe the explosion is due to the sudden conversion of water into steam of high tension. This happens in the least harmless way, when you strike with a wet hammer on a white hot tool, or when you drop the end of a hot tool into the liquid cinder in a furnace. In either case steam of high tension, and under some pressure, is suddenly formed. If the cinder be very hot, and the wet surface very large, and the weight of the body considerable (*e. g.*, a wet brick or a bucket full of water), the explosion will be as certain as serious. A careful puddler, in cooling off a furnace, will at first throw only small quantities of water upon the foreplate, or against the sides of a furnace. In this way the water spreads harmlessly on the hot cinder. I have known such puddlers to work furnaces for twelve years, without blowing up a single one. It is the general opinion of puddlers that small pieces of scale or cinder, in the water thrown in, cause the explosion, but I doubt if this be sufficient for a serious explosion, especially as they will, at every heat, sweep small pieces of cinder off the fireplate into the furnace when throwing in water. Accordingly, the certainty and force of the explosion will stand in a definite ratio to the temperature of the cinder, the area of the wet surface, and to the rapidity and force with which it is brought into contact with the hot cinder.—P. M. B., of Pa.

SOLDERING CASTINGS.—W. S. B. can solder gray cast iron as follows: First dip the castings in alcohol, after which, sprinkle muriate of ammonia (sal ammoniac) over the surface to be soldered. Then hold the casting over a charcoal fire till the sal ammoniac begins to smoke· then dip it into melted tin (not solder). This prepares the metal for soldering, which can then be done in the ordinary way.—J. R., of Mo.

SPINNING TIN PLATE.—It is not practicable to spin common tin plate like brass, (except in the form of plates or covers). But T. J. R. can take the iron without the plate, and make it red hot, spin it or press it, and afterwards plate it. If he fail in this *modus operandi*, let him hire a practical man to work it out for him.—J. R., of Md.

L. A. M., of Mass.—There is no difficulty in dissolving amber in chloroform, but people are apt to think they fail, from the circumstance that it is only partially soluble. Take some broken amber mouth-pieces of pipes (your tobacconist will set you up with them), reduce to a coarse powder and place in a bottle with rather more than enough chloroform to cover them well; shake often, and in a few days if you try it by pouring a drop or two of the clear liquid on a glass plate, you will find you have a varnish of good body, which gives a strong glaze. Or you can make an amber varnish as follows: Take of amber, 3 ounces; benzole, 50 ounces; heat the amber in a closed vessel to a temperature of about 570° Fah. When it begins to soften and swell, emitting white fumes, then dissolve in the benzole.

R. H., of Ala.—To prepare a plaster cast for electrotyping, first dry the plaster cast in the oven thoroughly, then get equal parts of beeswax and common resin, melt them together, and boil the cast until it will not absorb any more; when cold, get some good blacklead and cover the cast entirely, not thick but a bright surface, then you can electroplate in your battery as usual.

SILVER SOLDER.—Let your querist get 1 pwt., of pure silver, and ½ dwt. of common pins, and melt them together; he will have an easy flowing solder, but must use a gas jet to solder with.

C. D. of Ga.—You can cement cloth to polished iron shafts, by first giving them a coat of best white lead paint; this being dried hard, coat with best Russian glue, dissolved in water containing a little vinegar or acetic acid.

PASTE THAT WILL KEEP.—Take one tablespoonful of flour, add gradually one pint of cold water; boil slowly, and stir well to prevent burning, till it thickens. Keep it boiling till it becomes thin; then add one teaspoonful of nitro-muriatic acid, and boil till it again thickens, when it is ready for use. This paste is harmless, cheap, and less difficult to prepare than the formulæ in your last issue, and will neither turn sour nor mold.—H.

CEMENT FOR GLASS SYRINGES.—Let P. E. G. take resin two parts, gutta percha one part, melt together over a slow fire, apply hot, and trim with a hot knife.—H.

SOLDERING FLUID.—Let C. W. take muriatic acid and dissolve as much zinc in it as the acid will take.—J. K., of Mo.

COATING FOR BOAT BOTTOMS.—Let A. A. B. take 5 gallons boiled linseed oil, 4 gallons raw oil, 1 gallon benzine, and 80 pounds of Rocky Mountain vermilion.—H.

IVORY KEYS.—To glue on the ivory veneers, let J. H. take two parts pulverized gum arabic, and one part calomel, and add water sufficient to make a paste.—H.

PULVERIZED SOAP.—To pulverize hard soap, let M. B. C. pare it very thin with a hot knife, or spatula, and pulverize it in a mortar.—H.

PAINT FOR OLD WEATHER BOARDING.—The recipe for coating for boat bottoms, given above, is also excellent for old weather boarding.—H.

W. R. B., of Wis.—You can carry steam 200 feet from boiler to engine, without serious loss. We advise you to use the cement felting noticed in our last issue. Use a 1¼-inch pipe, which, though larger than is theoretically necessary, will, on account of its size, reduce the loss of pressure from boiler to engine.

W. A. M., of Me.—We are of the opinion that iron rails made of cast iron, cast upon wrought iron bars, would not prove desirable in use. However, the experiment could be easily tried, and that is the true way to determine their value.

C. O., of ——.—Any hollow sphere containing air will not float as high on the surface of water, as the same with the air exhausted.

S. P., of Quebec.—The filling of your mill with smoke from the forges is owing to the flue having too small capacity. The smoke and gas discharged into the mill is decidedly deleterious to the workmen.

H. R. O., of Mass.—It is probable that the acids used in making shoe polish do injure the leather more or less. Their action is, however, not very decided. In the recipe given recently in this column, in our issue of March 11, we think there is too large a proportion of acid, for a good blacking.

B. Y. C., of Va.—We know of no cheaper pipe than the tin-lined lead pipe that combines *all* the requisites of a first-class water pipe you specify.

D. C. R., of Ill.—We have not investigated into the nature of the anti-incrustation powders to which you refer, but we have usually found such preparations harmless.

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The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per Line will be charged.

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Carpenters wanted—$10 per day—to sell the Burglar Proof Sash Lock. Address G. S. Lacey, 27 Park Row, New York.

Manufacturers' and Patentees' Agencies, for the sale of manufactured goods on the Pacific coast, wanted by Nathan Joseph & Co., 619 Washington street, San Francisco, who are already acting for several firms in the United States and Europe, to whom they can give references.

Columbus, O., Feb. 27, 1871.—Messrs. McBeth, Bentel & Margedant:—Your Universal Wood Worker is giving entire satisfaction. Shall be most happy to inform any one of the many advantages that it certainly possesses over any other wood-working machine with which I have had experience. Yours truly, M. P. Ford, Master Car Builder, P. C. & St. L. R. R. Co.

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Improved mode of Graining Wood, pat. July 5, '70, by J. J. Callow, Cleveland, O. See illustrated S. A., Dec. 17, '70. Send stamp for circular.

All parties wanting a water wheel will learn something of interest by addressing P. H. Wait, Sandy Hill, N. Y., for a free circular of his Hudson River Champion Turbine.

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Brown's Coalyard Quarry & Contractors' Apparatus for hoisting and conveying material by iron cable. W. D. Andrews & Bro, 414 Water st., N.Y.

Improved Foot Lathes. Many a reader of this paper has one of them. Selling n all parts of the country, Canada, Europe, etc. Catalogue free. N. H. Baldwin, Laconia, N. H.

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For Solid Wrought-iron Beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa. For lithograph, etc.

The Merriman Bolt Cutter—the best made. Send for circulars. H. B. Brown & Co., Fair Haven, Conn.

Taft's Portable Hot Air, Vapor and Shower Bathing Apparatus. Address Portable Bath Co., Sag Harbor, N.Y. (Send for Circular.)

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For Fruit-Can Tools, Presses, Dies for all Metals, apply to Bliss & Williams, successor to May & Bliss, 118, 120, and 122 Plymouth st., Brooklyn, N.Y. Send for catalogue.

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To Ascertain where there will be a demand for new machinery or manufacturers' supplies read Boston Commercial Bulletin's Manufacturing News of the United States. Terms $4 00 a year.

APPLICATIONS FOR EXTENSION OF PATENTS.

STEAM PRESSURE GAGE.—Clara A. Eastman, Boston, Mass., has petitioned for an extension of the above patent. Day of hearing, May 31, 1871.

HYDRANT.—George P. Perrini, Richmond, Va., and James E. Boyle, New York city, have petitioned for an extension of the above patent. Day o hearing, June 7, 1871.

PICKER SAWING MACHINE.—John Haw, Hanover County, Va., has petitioned for an extension of the above patent. Day of hearing, June 7, 1871.

PASSENGER FARE BOXES.—John B. Slawson, New York city, has petitioned for an extension of the above patent. Day of hearing, July 12, 1871.

SELF-ACTING RAKE FOR HARVESTERS.—Salem T. Lamb, New Albany, Ind. has petitioned for an extension of the above patent. Day of hearing, June 14, 1871.

MACHINE FOR RIVETING BOILERS.—Silvester Bennett, Jefferson Parish La., has petitioned for an extension of the above patent. Day of hearing, June 14, 1871.

New Patent Law of 1870.

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Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

COMBINED ORE CRUSHER AND AMALGAMATOR.—Lyman Griswold, Denver, Colorado.—This invention relates to a new ore crusher, which is so constructed, by being provided with a set of inclined copper plates, that it will also serve as an amalgamator for the matter reduced on its dies. The invention consists in a new manner of securing and retaining the amalgamating copper plates; also in a novel set of elastic clamps for the same, and in a novel connection of casing and shute.

LEGISLATIVE TELLER AND RECORDER.—Dr. Adam Weston, Keeseville, N. Y.—This invention relates to a machine intended specially for use in legislative bodies, and which enables each member, by pulling one knob when he intends to vote, to display the number of his seat, either in the aye or nay column, in a conspicuous manner, on a plate elevated in full view from all parts of the hall; and also in a mechanism for conspicuously displaying the footing up of the whole number of ayes and noes, and in an apparatus for effecting the simultaneous printing of two separate and complete lists of ayes and noes.

LIQUID MEASURER.—Dr W. M. Wright, Chambersburg, Pa.—This invention consists mainly of two separate chambers, or two chambers combined in one, and of different capacities, the same being provided with a cock, so contrived, that, when turned in one direction, both chambers receive a supply of liquid at the same time, and when reversed, the supply passage is closed, and one or other of the chambers opened. The invention also consists in locating the mouths of the passage, whence the liquid escapes from the chambers, at the center of the bottoms thereof, in order that all the liquid may escape from the chambers, even when they stand inclined.

FILING AND SETTING MACHINE.—T. L. Shaw, Omaha, Nebraska.—This invention relates to a machine that accurately files, sets, and feeds a saw, and s provided with means for adapting itself to saws of any and all widths, and for giving the teeth a set of any required degree of inclination.

COMBINED SAD AND FLUTING IRON.—Frederick Myers, New York city.—This invention relates to improvements in combined sad irons and fluting irons, of that class in which two cast metal plates, consisting of a lower one and an upper one, are used, the lower one having a smooth sad iron face on the bottom, and a corrugated upper face, and the upper one being corrugated on the lower side, and both being provided with connecting devices, by which they may be connected together when the instrument is to be used as a sad iron, and discontinued when it is to be used for fluting. And the invention consists in the construction of the two plates with convex fluted surfaces, for acting on the goods by a rolling motion, and the employment, in connection therewith, of connecting apparatus, which will admit of such rolling or oscillating motion, and at the same time be capable of holding them firmly together when the instrument is used as a sad iron.

DAMPER.—L. S. Taylor, Sigel, Mo.—This invention relates to improvements in dampers for stove-pipes and other flues, and it consists in a tube arranged transversely through the pipe or flue, open at both ends, and having slots opening into the pipe or flue, in which tube is placed an other, having corresponding slots, and arranged for rotating for bringing its openings into coincidence with those in the first-mentioned tube, or to close said openings.

MANUFACTURE OF PICTURE NAIL HEADS.—Leopold Wolf, Meriden, Conn.—This invention relates to improvements in the manufacture of the metallic cups for picture nail heads, and consists in shaping the said cups in hand or power drawing presses, by a drawing process, whereby the inventor is enabled to accomplish the work by fewer operations and annealings than is required by the common mode.

COMPOSITION FOR STAINING WOOD.—John Winger, Kansas City, Mo.—This invention relates to a new and useful improvement in a composition for for staining wood of the color of black walnut.

SYSTEM OF BALANCING VERTICAL RECIPROCATING MASSES.—William F. Durfee, Bridgeport, Conn.—This invention relates to a new and improved mode of balancing the weight of vertical reciprocating masses of matter, in order that the power applied to give such masses their vertical reciprocating movement may be no greater in their upward than in their downward direction.

WINE BASKET.—J. Roussillon, Epernay, France.—This invention relates to a new and useful improvement in willow baskets for holding and transporting bottles of wine and other articles, more especially intended as a pic-nic" basket.

WIRE SCREEN.—Samuel Holdsworth, Maspeth, N. Y.—This invention relates to a new and useful improvement in wire screens for masons' use in screening sand, and also for screening grain and coal.

WINDOW CURTAIN FIXTURE.—Thomas C. Williams, East Randolph, Wis.—This invention relates to a new and useful improvement in mode of operating window shades or curtains of textile material or paper.

PLATEN FEED GUIDES.—Edward L. Megill, Brooklyn, N. Y.—This invention has for its object to furnish an improved feed guide, for platen printing presses, which is designed to take the place of the inconvenient contrivances, such as common pins, quads, reglets, cardboards, etc., generally employed upon such presses by printers for the purpose of registering sheets of paper or other material.

SAWING MACHINE.—Jacob Felton, Fairmount, Ind.—This invention relates to a new drag saw, which is constructed with the object of avoiding excessive friction during the operation of sawing, and for permitting a ready adjustment of parts.

GREEN GLAZE FOR FLOWER POTS.—John E. Brooks, Yarmouth, Me.—This invention has for its object to furnish an improved green glaze for flower pots, which shall be so inexpensive as to adapt it for use upon common earthenware, while at the same time giving to the ware a beautiful finish.

LUBRICATOR FOR STEAM CYLINDERS.—Tapping Reeves, Little River, Cal.—This invention has for its object to furnish an improved lubricator for steam cylinders, which shall be so constructed that it may be supplied with oil when the cylinder is under steam pressure, and which will enable the water of condensation to be readily blown off when it is necessary to replenish the reservoir with oil.

ANIMAL TRAP.—James D. Pell, New York city.—This invention has for its object to improve the construction of the ordinary wooden animal traps, so as to make them more convenient in use, and more effective in operation.

MACHINE FOR COILING DOUBLE BED SPRINGS.—Matthew Van Vleck Albany, N. Y.—This invention consists in the application of single or double winding cones, to two separate slides, the cones revolving in opposite directions to produce the right and left cones or coils of a double bed spring from one wire.

NAIL MACHINE.—Henry Reese, Baltimore, Md.—In our notice of this invention, in the issue of the 11th inst., we stated that the operation of the machine produces a "headless nail," and that "the head of the nail is ormed by a subsequent operation." This is not true. The nail is finished and cut from the rod by one operation.

BLIND WIRING MACHINE.—Elijah F. Dunaway, Cincinnati, Ohio.—This invention relates to a new machine for wiring blind slats and rods, and has for its object to make the apparatus entirely adjustable for applying staples of suitable length to articles of various thicknesses.

HAY FORK.—Benjamin F. Brown, Catlin, Ind.—This invention relates to improvements in hay forks, and consists in a pair of bars, barbed at one end, and pivoted together so that the bars being closed against each other, the said barbed ends constitute one point which may be readily forced into the hay, after which they may be separated to hold it for elevating, in which position they are held by a pair of bars and a trip catch, one of which bars is connected to the lifting bars where they are pivoted, and the other to a part of toggle-pointed bars, pivoted to the said lifting bars, and this latter slides on the other as the lifting bars open and close, and is held in one position, to keep them open, by the trip catch.

MACHINES FOR WEAVING EMBROIDERY.—Joseph Clough and Joseph Crompton, Chicopee, Mass.—This invention relates to improvements in machines for weaving embroidery, and it consists in an improved arrangement of adjustable corners and connecting rods with the needle bars and a a pattern wheel or former, having for its object the weaving of three distinct patterns simultaneously. It also consists in an arrangement of the driving gear for working the pattern wheel calculated to facilitate the setting of the pattern wheel back, or adjusting it with exactness to make the exact adjustments of the needles with the patterns, often required in case of accidents.

Inventions Patented in England by Americans.

[Compiled from the Commissioners of Patents' Journal.]

APPLICATIONS FOR LETTERS PATENT.

533.—IMPROVED SAND, GLASS, OR EMERY PAPER OR CLOTH.—G. C. Taft, Worcester Mass., and J. H. Armbruster, Philadelphia, Pa. Feb. 28, 18 1.

549.—APPARATUS FOR REGULATING PRESSURE OF STEAM IN DRYING CYLINDERS, ETC.—Benaiah Fitts, Worcester, Mass. March 1, 1871.

575.—SUGAR MANUFACTURING APPARATUS.—Claus Spreckles, San Francisco, Cal. March 3, 1871.

578.—FLEXIBLE SHAFTING AND OTHER APPARATUS FOR TRANSMITTING POWER.—J. B. Morrison, St. Louis, Mo. March 3, 1871.

587.—LAMPWICKS.—H. O. Whipple, New York city. March 4, 1871.

590.—MEASUREMENT OF FOLDED OR ROLLED FABRICS.—Edward Morgan, Washington, D. C. March 4, 1871.

596.—GASELIERS, SLIDING GAS PENDANTS, AND SLIDING GAS BRACKETS.—John Horton, 620 Broadway, New York city, now residing at 118 Hagley Road, Edgbaston, near Birmingham, England.

600.—TYPE-DISTRIBUTING MACHINERY.—D. B. Thompson, Brooklyn, N. Y. March 6, 1871.

602.—COMBINED SAFETY VALVE AND WHISTLE.—G. H. Clemens, Chicago, Ill. March 6, 1871.

Official List of Patents.

ISSUED BY THE U. S. PATENT OFFICE.

FOR THE WEEK ENDING MARCH 21, 1871.

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112,764.—COMPOSITION FOR PAVEMENTS.—Nathan S. Abbott, Brooklyn, N. Y.

112,765.—BED BOTTOM.—John H. Allyn, Whitesborough, N. Y.

112,766—PRESSING AND BALING HAY.—George H. Aylworth, Brighton, Ill.

112,767.—HAT AND CAP HOLDER.—Charles Beeny, Albany, N. Y.

112,768.—PUMP PISTON.—Daniel W. Bell, St. Louis, Mo.

112,769.—HORSESHOE MACHINE.—Uriah Billings, Cambridgeport, Mass.

112,770.—PISTON-ROD PACKING.—James H. Blessing (assignor to himself and Frederick Townsend), Albany, N. Y.

112,771.—TAP AND NOZZLE FOR OIL CANS.—J. A. Bostwick, New York city.

112,772.—GLASS-BLOWER'S MOLD.—Samuel R. Bowie (assignor to himself and William L. Libbey & Brother), New Bedford, Mass.

112,773.—HORSESHOE.—Joseph Brackett, Lynn, Mass.

112,774.—STREET LAMP.—George Brandon, New York city.

112,775.—MACHINE FOR UPSETTING BOLTS.—Benjamin Briscoe and Joseph A. Briscoe (assignors to the Michigan Bolt and Nut Company), Detroit, Mich.

112,776.—GREEN GLAZE FOR FLOWER POTS.—John E. Brooks, Yarmouth, Me.

112,777.—HORSE HAY FORK.—Benjamin F. Brown, Catlin, Ind.

112,778.—DEVICE FOR TRANSPORTING EGGS.—A. H. Bryant, Chicago, Ill. Antedated March 9, 1871.

112,779.—PNEUMATIC TELEGRAPH.—Edward A. Calahan, Brooklyn, and George B. Field, New York city.

112,780.—COMBINED GAGE AND TRY SQUARE.—Frederic Castle (assignor to himself and Newbury J. Eaton), Montana, Iowa. Antedated March 18, 1871.

112,781.—PEN HOLDER.—Benjamin Charles, Akron, Ohio.

112,782.—THRASHING MACHINE.—Francis G. Chesman, Lemont, Ill.

112,783.—THILL COUPLING.—Newton J. Clark (assignor to himself and Milton H. Clark), Clarkston, Mich.

112,784.—EGG AND FRUIT CARRIER.—Wm. J. Clark, Lena, Ill.

112,785.—LAPPET LOOM.—Joseph Clough and Joseph Crompton, Chicopee, Mass.

112,786.—COATING GAS AND WATER-PIPE.—Nicholas Clute, Schenectady, N. Y.

112,787.—BLOTTING PAD.—Alfred Q. Collins, Cambridge, Mass.

112,788.—SAWING MACHINE TABLE.—Jonathan Creager, Cincinnati, Ohio.

112,789.—FIRE SHOVEL.—Isaac W. Denning, Allegheny City, Pa.

112,790.—WASHING MACHINE.—William James Dodge, Syracuse, N. Y., assignor to himself, Manson T. Briggs, and Wm. H. Thrall, New York city.

112,791.—BLIND WIRING MACHINE.—Elijah F. Dunaway, Cincinnati, Ohio.

112,792.—BALANCING VERTICAL-RECIPROCATING MASSES.—Wm. F. Durfee, Bridgeport, Conn., assignor to himself and Jackson & Wiley, Detroit, Mich.

112,793.—ADJUSTABLE BEVEL.—Willard C. Ellis (assignor of one-half his right to Rufus A. Russell), Springfield, Mass.

112,794.—SAWING MACHINE.—Jacob Felton, Fairmount, Ind.

112,795.—MAGAZINE FIREARM.—Harbert K. Forbis, Danville, Ky. Antedated March 10, 1871.

112,796.—CHURN.—David Frankfoder, Wakarusa, Ind.

112,797.—HORSE-COLLAR PAD.—John Fraser (assignor to himself and John J. Hardy), Dowagiac, Mich.

112,798.—TELEGRAPH SWITCH.—Alexander H. Freeman, Chicago, Ill.

112,799.—BIT BRACE.—Raymond French, Seymour, Conn.

112,800.—LOOP FOR STIRRUPS.—J. B. Gathright, Louisville, Ky.

112,801.—VISE FOR JOINER'S USE.—Jonathan Good, Lancaster, Pa.

112,802.—MACHINE FOR SEWING BOOTS AND SHOES.—Chas. Goodyear, Jr., New Rochelle, N. Y.

112,803.—BREECH-LOADING FIREARMS.—G. B. Gray and J. H. Romans, Mount Vernon, Ohio.

112,804.—COMBINED ORE CRUSHER AND AMALGAMATOR.—Lyman Griswold, Denver, Colorado Territory.

112,805.—RAILWAY-RAIL CHAIR.—Samuel M. Guest, Ypsilanti, Mich.

112,806.—CHURN.—H. S. Gurney and Horace Merrill, Memphis, Mich.

112,807.—MOUSE AND ANIMAL TRAP.—George L. Hart, New Britain, Conn.

112,808.—APPARATUS FOR CUTTING THE ENDS OF CIGARS.—Mathias Joseph Hinden (assignor to Adolph Freund), Detroit, Mich.

112,809.—SAND SCREEN.—Samuel Holdsworth, Maspeth, N. Y.

112,810.—CORD-GUIDE FOR SEWING MACHINES.—Henry Horn (assignor to John O. Fairbairn), Milwaukee, Wis.

112,811.—THILL COUPLING.—Benjamin F. Horton, Ithaca N. Y.

112,812.—SASH HOLDER.—Philo B. Hovey, New London Conn.

112,813.—BEE HIVE.—Washington J. Kelly, Commerce, Mich

112,814.—CURTAIN FIXTURES.—Wm. C. Kennedy, Commerce Mich.

112,815.—CLOTHES WRINGER.—Alexander King, Philadelphia, Pa.

112,816.—DRAWER PULL.—Joseph Kintz (assignor to himself and P. J. Clark), West Meriden, Conn.

112,817.—SHAFT COUPLING.—Darius Knickerbocker and Samuel Knickerbocker, Allegan, Mich.

112,818.—RECTIFYING HIGH WINES.—Archibald K. Lee, Galveston, Texas.

111,819.—PHYSICIAN'S SADDLE-BAG.—A. M. Leslie, St. Louis, Mo.

112,820.—WASHBOARD.—Charles Letterman, Syracuse, N. Y. assignor to John W. Throop.

112,821.—PLANING MACHINE.—Charles Levey, Toronto, Canada.

112,822.—COTTON PRESS.—Eli W. Long and Isaac N. Patten, Memphis, Tenn.

112,823.—TOY PUZZLE.—Samuel Loyd, New York city.

112,824.—BOILER FOR HEATING PURPOSES.—J. A. Maynard Newtonville, Mass.

112,825.—HYDRANT.—John McCann, Albany, N. Y. Antedated March 2, 1871.

112,826.—RAILWAY SHIFTING TRUCK.—P. H. McWilliams, Detroit, Mich.

112,827.—PLATEN FEED GUIDE.—Edward L. Megill, Brooklyn N. Y.

112,828.—MANUFACTURE OF IRON AND STEEL.—John W. Middleton, Philadelphia, Pa.

112,829.—CRANE.—John W. Middleton, Philadelphia, Pa.

112,830.—PEAT MACHINE.—Herman Mielisch, Racine, Wis.

112,831.—APPARATUS FOR REFINING METALS.—Adolph Millochau, New York city.

112,832.—APPARATUS FOR REMOVING PAINT, VARNISH, ETC.—Theodore F. Moody, Toledo, Ohio. Antedated March 14, 1871.

112,833.—SASH HOLDER.—James B. Morgan, Davenport, Iowa assignor to himself and Maurice J. Keating, Rock Island, Ill.

112,834.—WAGON SEAT.—Valentine Myers (assignor to himself and John M. Phelps), Cogan Station, Pa.

112,835.—ROAD SCRAPER.—William T. Nichols, Chicago, Ill

112,836.—TELEGRAPH APPARATUS.—Henry C. Nicholson, Mt Washington, Ohio.

112,837.—SWEEPING MACHINE.—George S. Norris, Baltimore, Md.

112,838.—MACHINE FOR GRINDING SAW TEETH.—John L. Otis, Leeds, Mass.

112,839.—PREPARING TIN SALTS FROM TINNERS' WASTE.—Adolph Ott (assignor to New York Metal and Chemical Manufacturing Company), New York city.

112,840.—SHUTTER FASTENER.—Charles Pabst, Wilmington Del.

112,841.—ELECTRO-MAGNETIC MOTOR.—Henry M. Paine, New ark, N. J., assignor to Mahlon S. Frost, New York city.

112,842.—BIT AND DRILL BRACE.—George G. Parker, and William P. Dodge, Prospect, New York.

112,843.—GATE.—Noah Parker, Thimble County, Ky.

112,844.—ANIMAL TRAP.—James D. Pell, New York city.

112,845.—PREPARING SEED CORN.—John Meek Petit, Monroe Township, Ohio.

112,846.—BROILER.—Edward B. Phelps and James P. McLean, Brooklyn, N. Y.

112,847.—LUBRICATOR.—Tapping Reeves, Little River, Cal.

112,848.—MANUFACTURE OF NITRO-GLYCERIN.—Edward A. L. Roberts, Titusville, Pa.

112,849.—MANUFACTURE OF NITRO-GLYCERIN.—Edward A. L. Roberts, Titusville, Pa.

112,850.—ELECTRIC AND OTHER FUSE HEADS.—Edward A. L. Roberts, Titusville, Pa.

112,851.—"CHAFE IRONS" FOR WHEELED VEHICLES.—Edward P. Roche, Bath, Me.

112,852.—WINE BASKET.—Jean Roussillon, Epernay, France.

112,853.—STEAM ENGINE.—Stephen P. Ruggles, Boston, Mass.

112,854.—HORSE HAY RAKE.—John H. Schoonmaker, Bethlehem, assignor to himself and Alexander Selkirk, Albany, N. Y. Antedated March 10, 1871.

112,855.—HOISTING MACHINE.—John Scott, Pontiac, Mich.

112,856.—HOISTING MACHINE.—William Sellers, Philadelphia, Pa.

112,857.—BUCKLE FOR SUSPENDERS.—Abraham Shenfield, New York city.

112,858.—COMPOUND FOR TREATING CATARRH, ETC., BY INHALATION.—Dana Slade, Chicago, Ill.

112,859.—ELECTRIC FUSE.—Henry Julius Smith, Boston, Mass. Antedated March 7, 1871.

112,860.—HAND TOOL FOR CARVING AND ENGRAVING.—Geo. B. Soley, Philadelphia, Pa.

112,861.—GAGE FOR SAW TABLES.—Franklin L. Sprague, Keene, N. H., assignor to William H. Doane, Cincinnati, Ohio.

112,862.—CULTIVATOR.—William D. Stroud, Oshkosh, Wis.

112,863.—DAMPER.—Leonard S. Taylor, Sigel, Mo.

112,864.—STUMP EXTRACTOR.—Albert D. Tilyon, Norwich assignor to Cornelius A. Church, New Berlin, N. Y.

112,865.—BRAKE FOR RAILWAY CARS.—Lewis W. Tracy (assignor to himself and James E. Granniss), New York city.

112,866.—TWEER.—Eben Trasy, Vermontville, Mich.

112,867.—ROLL FOR THE MANUFACTURE OF PLANTERS' HOES.—John T. Tyler, Pittsburgh, Po.

112,868.—MACHINE FOR COILING BED SPRINGS.—Matthew Van Vleck, Albany, N. Y.

112,869.—COMBINED HARROW, SEEDER, AND ROLLER.—Joseph Vessot, Sr., and Samuel Vessot, Jr., Joliette, Canada.

112,870.—COMPOUND POTATO PLANTER AND DIGGER.—James Carroll Walker, Farmington, Mich.

112,871.—HAND STAMP.—John Walters, Norfolk, Va., assignor to William O. Hickok, Harrisburg, Pa.

112,872.—VEGETABLE GRATER.—Jacob Wehrle and William Wittlinger, Cincinnati, Ohio.

112,873.—MACHINE FOR GRINDING CARRIAGE SPRINGS.—Hebron Mayhew Wentworth, Gardiner, Me.

112,874.—FINISHING PAPER BOXES.—Seth Wheeler and Edgar Jerome, Albany, N. Y. Antedated March 16, 1871.

112,875.—BARREL.—Henderson Willard, Grand Rapids, Mich.

112,876.—WINDOW CURTAIN FIXTURE.—Thomas Charles Williams, East Randolph, Wis.

112,877.—GLASS FOR THE MANUFACTURE OF SPECTACLES.—Thomas Atwood Willson, Reading, Pa.

112,878.—BOLSTER BLOCK, AND PIER OR ABUTMENT PLATE FOR BRIDGES AND ROOF TRUSSES.—Joseph M. Wilson, Philadelphia Pa.

112,879.—COMPOSITION FOR STAINING WOOD.—John Winger, Kansas City, Mo.

112,880.—MECHANISM FOR MANUFACTURING HEADS FOR PICTURE NAILS.—Leopold Wolf (assignor to the Meriden Malleable Iron Company), Meriden, Conn.

112,881.—STEAM HEATER.—Charles J. Wood, Baltimore, Md.

112,882.—RUFFLING ATTACHMENT FOR SEWING MACHINES.—Frederick B. Zay, Findlay, Ohio.

112,883.—SAW MILL.—Emanuel Andrews, Williamsport, Pa. Antedated March 10, 1871.

112,884.—CLOTHES WRINGER.—Alfred M. Bailey (assignor to "The Metropolitan Washing Machine Company), Middlefield, Conn.

112,885.—ROCK DRILL.—Albert Ball (assignor to Sullivan Machine Company), Claremont, N. H.

112,886.—SASH HOLDER.—William Thomas Bausmith, Aberdeen, Md.

112,887.—IRON RAILING.—Samuel S. Bent, Port Chester, N. Y.

112,888.—CLEVIS HOOK FOR DOUBLE TREES.—Warren W. Bentley, Lee Township, Mich.

112,889.—ATTACHMENT FOR HARNESS.—William A. Blundell, St. Louis, Mo., assignor to himself, William P. Nelson and Mathew C Tully.

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112,890.—ADVERTISING LAMP.—Emil Boesch, San Francisco, Cal.
112,891.—WHIP STOCK.—John J. Bohler, Westfield, Mass.
112,892.—MOWING MACHINE.—Aaron Bolander, Akron, Ohio.
112,893.—PORTABLE RAILWAY.—Theodore Bootsman, Tompkinsville, N. Y.
112,894.—CORN PLANTER.—Richard A. Boulware, Doniphan, Kansas.
112,895.—DEVICE FOR OPENING OYSTERS.—Michael C. Boyer, Norristown, Pa.
112,896.—APPARATUS FOR TEMPERING SAND.—John C. Broadmeadow, Bridgeport, Conn.
112,897.—RAILWAY CAR TRUCK.—Chauncey S. Buck (assignor to himself and James Lovett), St. Louis, Mo.
112,898.—ROOFING BRACKET.—Jonathan W. Cadwell, Springfield, Mass.
112,899.—VALVE GEAR FOR STEAM ENGINE.—A. S. Cameron, New York city.
112,900.—STILL.—James A. Campbell, Dayton, Va., assignor to himself, A. K. Layman, and L. W. Myers.
112,901.—THREAD GUIDE FOR WINDING MACHINES.—D. M. Church, Holyoke, Mass.
112,902.—SHOEMAKERS' HAMMER.—Arthur Clarke, Boston, Mass.
112,903.—DOOR BELL.—John P. Connell, Kensington, Conn.
112,904.—GATE.—Peter S. Crawford, Union, Ill.
112,905.—CARRIAGE GEARING.—Cornelius Custer, Norristown, Pa.
112,906.—HARNESS ROSETTE.—W. D. Davis, C. W. Blakeslee, and J. C. Peck, Watertown, Conn.
112,907.—CALL BELL.—H. A. Dierkes and John Fretts, New York city; John Fretts assigns his right to H. A. Dierkes.
112,908.—CIRCULAR SAW BENCH.—B. F. Dunklee, Concord, N. H.
112,909.—ADJUSTABLE MILL FEED.—Wm. T. Duvall, Washington, D. C.
112,910.—LOCKED COCK.—Henry Essex, Meadeville, Pa.
112,911.—SAND SCREEN.—G. W. Fair, Dayton, Ohio.
112,912.—BED BOTTOM.—Matthew Faloon, Bloomington, Ill.
112,913.—PLOW.—L. F. Frazee, Jersey City, N. J.
112,914.—TWEER FOR BLAST FURNACES.—John Fry, Salisbury, Conn.
112,915.—CENTER POINT TRIMMING.—Ansel Hecht, New York city.
112,916.—CULINARY VESSEL.—Levi Hermance (assignor of one half his right to P. J. Marsh), Lansingburgh, N. Y.
112,917.—PENCIL CASE.—W. S. Hicks, New York city.
112,918.—ORE SEPARATOR.—Wm. Hooper, Ticonderoga, N.Y. Antedated March 10, 1871.
112,919.—ORE SEPARATOR.—Wm. Hooper, Ticonderoga, N.Y. Antedated March 10, 1871.
112,920.—MEDICAL COMPOUND OR SALVE.—Martha Huddleston, Jackson, Tenn.
112,921.—FAN AND FLY DRIVER.—Frank M. Hunt, Clinton, Ga.
112,922.—CATTLE TIE.—Seth T. Hutchins, North Anson, Me.
112,924.—ROLLING MILL.—Asa Johnson, Brooklyn, N. Y., assignor to himself and W. H. Johnson, New York city.
112,925.—HOLLOW TILE WALL.—G. H. Johnson, New York city.
112,926.—HOLLOW TILE FLOOR.—G. H. Johnson and Balthasar Kreischer, New York city.
112,927.—RESERVOIR FOR GRAIN AND OTHER MATERIALS.—G. H. Johnson and Balthasar Kreischer, New York city.
112,928.—FIRE ESCAPE.—C. P. Kenyon (assignor to himself and J. W. Sharp), Selma, N. C.
112,929.—COMPOSITION TILE FOR FIRE-PROOFING BUILDINGS.—Balthasar Kreischer, New York city.
112,930.—HOLLOW TILE.—Balthasar Kreischer, New York city.
112,931.—STOVEPIPE SHELF AND CLOTHES DRIER.—Geo. W. Langdon (assignor to himself and Lewis Seneare), Greene, N.Y.
112,932.—BELL HANGING.—A. L. Sas Slyhens, near Ostend, Belgium.
112,933.—LEGGOTYPING.—W. A. Leggo, Montreal, Canada.
112,934.—HINGE.—M. R. Lemman, Hamilton, Ohio.
112,935.—WOOD SCREW.—Andrew B. Lipsey, West Hoboken, N. J.
112,936.—BASE-BURNING STOVE.—Lyman Litchfield, Gouverneur, N. Y., assignor to himself and H. K. Osborne, Arlington, Mass.
112,937.—TRAVELING TRUNK.—John C. Locke, Rochester, N. Y.
112,938.—CHAIN FOR HANGING SASH.—Michael McGrath, New York city.
112,939.—BOAT-LOWERING APPARATUS.—George W. Mallory, Mystic Bridge, Conn.
112,940.—HARVESTER RAKE.—John P. Manny, Rockford, Ill.
112,941.—HARVESTER RAKE.—John P. Manny, Rockford, Ill.
112,942.—HARVESTER.—John P. Manny, Rockford, Ill.
112,943.—SAW WITH DETACHABLE TEETH.—T. P. Marshall, Trenton, N. J.
112,944.—APPARATUS FOR MANUFACTURING WIRE.—B. A. Mason (assignor to T. L. Carpenter), New York city.
112,945.—WOOD PAVEMENT.—G. A. May, Chicago, Ill.
112,946.—BRAIDING MACHINE.—John McCahey and Stephen B. Salisbury (assignors to the New England Butt Company), Providence, R. I.
112,947.—BUCKLE.—Duncan McMillan and Abram Rowan, Webster City, Iowa.
112,948.—STEAMING ATTACHMENT FOR KEROSENE STOVES.—R. B. Mitchell, Chicago, Ill.
112,949.—MOLDNG PLANE.—Ellis H. Morris, Canton, Ohio.
112,950.—KEEP AND BRACE FOR FIFTH WHEELS.—Francis B Morse (assignor to H. D. Smith & Co.), Plantsville, Conn.
112,951.—PENCIL SHARPENER.—Elias P. Needham, New York city.
112,952.—ANKLE BRACE.—Jacob S. Niswander, Oakland, Cal.
112,953.—PIE CASE.—H. H. Olds, New Haven, Conn.
112,954.—CAR BRAKE AND STARTER.—Joseph Caradis (assignor to himself and Sarah Parker), Brooklyn, N. Y.
112,955.—LIFTER FOR FRUIT JAR.—S. R. Pinckney, New York city.
112,956.—GATE FOR TURBINE WATER WHEEL.—Samuel A. Prescott, Sutton, Mass.
112,957.—APPARATUS FOR ESTABLISHING ELECTRICAL COMMUNICATION IN RAILROAD TRAINS.—P. D. Prud'homme, Paris, France, assignor to Charles De Frondat and Alfred Michant, Boston, Mass.
112,958.—PIPE COUPLING.—J. B. Ramp, Cuyagoga Falls, Ohio.
112,959.—PRESSED FRUIT LIFTER.—Ennis A. Raymond, Waterloo, Iowa.
112,960.—BROOM.—C. L. Reid, Louisville, Ky.
112,961.—PORTABLE FURNACE.—Jesse Reynolds, Philadelphia, Pa.
112,962.—REVERSIBLE BOOT HEEL.—Frederick Richardson and Francis Hacker (assignors to Reversible Boot Heel Co), Providence, R. I.
112,963.—FRUIT DRIER AND FOOD WARMER.—Seelye Richmond (assignor of one half his right to Joseph E. Dickson), Annapolis, Md.
112,964.—TILE STOVE.—E. Y. Robbins, Cincinnati, Ohio. Antedated March 13, 1871.
112,965.—PORTABLE FURNACE.—W. D. Robertson, Knoxville, Tenn.
112,966.—HAY AND COTTON PRESS.—C. A. Robinson, Florence, Ind.
112,967.—MACHINE FOR HUSKING CORN.—Jacob Russell, N. Y.
112,968.—END GATE FOR WAGONS.—J. F. Sener, Lancaster, Pa.
112,969.—HYDRAULIC NOZZLE.—Henry Shaw, Nevada City, Cal.
112,970.—SAW-SET AND FILER.—T. L. Shaw, Omaha, Neb.
112,971.—TURNING LATHE.—S. D. Sheldon, Fitchburg, Mass.
112,972.—SHAFT COUPLING.—James Sherry, Watertown, N. Y.
112,973.—MANUFACTURE OF EYELET STOCK.—S. N. Smith, Providence, R. I.
112,974.—HOLDER FOR DRINKING GLASSES.—J. V. Snider, Philadelphia, Pa.
112,975.—GAS MACHINE.—T. G. Springer, St. Louis, Mo. Antedated March 10, 1871.
112,976.—WHISK BROOM.—Greenleaf Stackpole, Elizabeth, N. J.
112,977.—CHEESE HOOP.—William Sternberg, Bridgeport, N. Y.
112,978.—HINGE FOR SEWING MACHINES.—R. H. St. John, Bellefontaine, Ohio.
112,979.—SAW GUMMER.—N. F. Stone, deceased (Amanda Stone and Benjamin Holbrook, administrators), Chicago, Ill. Antedated March 14, 1871.
112,980.—NEEDLE FOR SEWING MACHINES.—Edwin Strain, Newton, Mass.
112,981.—HYDROCARBON GAS APPARATUS.—M. H. Strong and W. I. Reid, Brooklyn, N. Y.
112,982.—FIRE ESCAPE.—T. L. Summeril, Juda, Wis.
112,983.—SOAP DISH.—J. M. Thatcher, Bergen, N. J.
112,984.—BOOK SUPPORT.—S. M. Thompson, Providence, R. I.
112,985.—SASH HOLDER.—Alexander Thomson, Champaign, Ill.
112,986.—FIRE-PLACE GRATE.—J. W. Thorniley, New Brighton, Pa.
112,987.—ALARM LOCK.—J. H. Thorp, New York city.
112,988.—ELASTIC ROLL.—W. H Towers, Boston, Mass.
112,989.—THILL COUPLING.—Charles Twombly, Boston, Mass.
112,990.—WALKING CULTIVATOR.—John Vanluvanee and Hugh Smith, Moline, Ill.
112,991.—APPARATUS FOR CONVERTING RECIPROCATING INTO ROTARY MOTION.—Franz Wagner, New York city.
112,992.—METER.—Franz Wagner, New York city.
112,993.—COOKING STOVE.—G. W. Walker, Boston, Mass.
112,994.—CULTIVATOR.—F. N. Welden, Rockford, Ill.
112,995.—FUEL AND KINDLING WOOD.—W. E. Wertenbaker, Washington, D. C.
112,996.—ZINC BOARD FOR STOVES.—William Westlake, Chicago, Ill.
112,997.—BREECH LOADING FIRE-ARM.—Eli Whitney, New Haven, Conn.
112,998.—RAILWAY RAIL AND CHAIR.—W. E. Winby, Edgbaston, England.
112,999.—SHIP'S COMPASS.—G. W. Wood (assignor to M. A. Wood), Brooklyn, N. Y.
113,000.—TYING BROOMS AND BRUSHES.—J. H. Anderson, Terre Haute, Ind., assignor to Thomas Marston, Jr., W. L. Peck, and C. I. Peck, Chicago, Ill. Antedated Feb. 14, 1871.

REISSUES.

4,305.—SEWING MACHINE.—C. O. Crosby, New Haven, assignor to N. A. Baldwin, Milford, Conn.—Patent No. 21,745, dated October 12, 1858.
4,306.—COPYING PRESS.—E. W. Frost, New York city, assignee of Francis Hovey.—Patent No. 42,141, dated March 29, 1864.
4,307.—SEED DRILL.—F. H. Manny, Rockford, Ill., assignee of M. C. Younglove.—Patent No. 20,603, dated June 15, 1858.

DESIGNS.

4,721.—CARPET PATTERN.—Jonathan Crabtree (assignor to Leedom, Shaw & Stewart), Philadelphia, Pa.
4,722.—ORNAMENTAL CHAIN LINK.—Virgil Draper (assignor to O. M. Draper), Attleborough, Mass.
4,723.—CHAIN LINK.—Virgil Draper (assignor to O. M. Draper), Attleborough, Mass.
4,724.—SHOW CASE.—W. H. Grove, Philadelphia, Pa.
4,725.—SIDE FRAME OF SCHOOL DESKS.—A. F. Old (assignor to J. A. Bancroft & Co.), Philadelphia, Pa.
4,726 and 4,727.—TYPE.—W. H. Page (assignor to W. H. Page & Co.), Norwich, Conn. Two patents.
4,728.—TYPE BORDER.—W. H. Page (assignor to W. H. Page & Co.), Norwich, Conn.
4,729.—WHISK BROOM.—Greenleaf Stackpole, Elizabeth, N. J.
4,730.—SWORD.—E. S. Warren, Springfield, Mass.
4,731.—HANDLE FOR SPOONS OR FORKS.—George Wilkinson (assignor to Gorham Manufacturing Co.), Providence, R. I.

TRADE-MARKS.

197.—PLUMBAGO GREASE.—American Graphite Co., New York city.
198.—PUMP.—C. G. Blatchley, Philadelphia, Pa.
199.—WOOLEN GOODS.—W. P. Gibbs, R. G. Ross, I. N. Field, and W. B. Field, St. Charles City, Mo.
200.—WEIGHING SCALE.—E. F. Jones, Binghampton, N. Y.
201.—WHISKEY.—Mills, Johnson & Co., Cincinnati, Ohio.
202.—SHIRT.—Morison, Son & Hutchinson, New York city.
203.—TOBACCO.—E. J. Oppelt, Baltimore, Md,
204.—BURNING FLUID.—R. G. Richards, New York city.
205.—SLATES, ETC.—The Silicate Slate Co., N. Y.
206.—WINE.—M. Werk & Sons, Cincinnati, Ohio.

EXTENSIONS.

WATER WHEEL.—Samuel Reynolds. of Ellisburg, N.Y.—Letters Patent No. 16,881, dated March 24, 1857.
STEAM BRAKES FOR RAILROAD CARS.—T. E. Sickels, of Omaha, Neb. Letters Patent No. 16,884, dated March 24, 1857.

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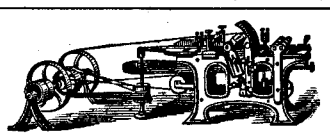

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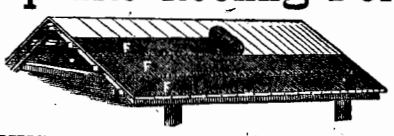

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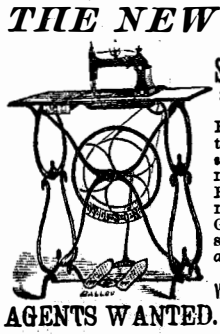

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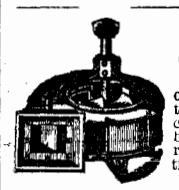

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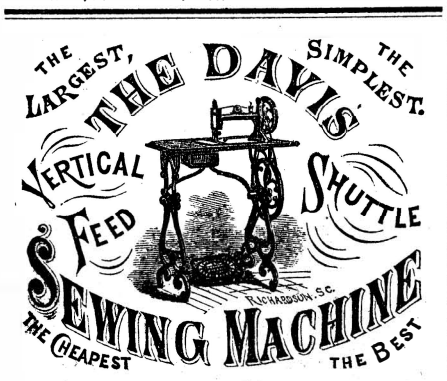

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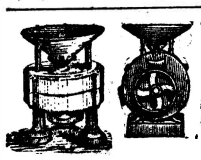

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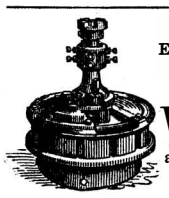

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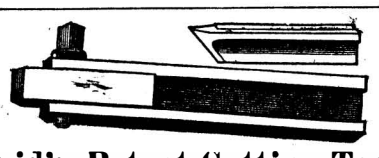

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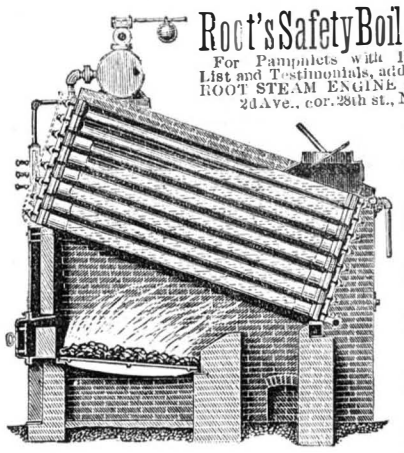

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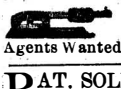

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